

TRANSPORTATION TRAUMA AND PSYCHOLOGICAL MORBIDITY:  
ANXIETY, DEPRESSION, PTSD, AND PERCEIVED  
CONTROL IN A HOSPITALIZED SAMPLE

Quinn M. Biggs, M.P.H.

Dissertation Prepared for the Degree of  
DOCTOR OF PHILOSOPHY

UNIVERSITY OF NORTH TEXAS

August 2007

APPROVED:

Kim Kelly, Major Professor  
Sharon Clark, Committee Member  
Joseph Critelli, Committee Member  
Charles Guarnaccia, Committee Member  
Linda Marshall, Chair of the Department of  
Psychology  
Sandra L. Terrell, Dean of the Robert B. Toulouse  
School of Graduate Studies

Biggs, Quinn M., *Transportation trauma and psychological morbidity: Anxiety, depression, PTSD and perceived control in a hospitalized sample*. Doctor of Philosophy (Health Psychology and Behavioral Medicine), August 2007, 128 pp., 12 tables, 7 figures, references, 121 titles.

Transportation-related collisions are ubiquitous and often traumatic. Identifying post-collision psychological distress and the characteristics of the collision survivor that lead to distress are vital to the development of early and appropriate interventions. The goals of this study were: 1) to use a questionnaire as opposed to a typical diagnostic interview, 2) to confirm that psychological distress is present in currently hospitalized transportation-related collision survivors, 3) to confirm that different types of distress co-occur, 4) to determine if distress is more likely to occur in those who have had prior distress, and 5) to explore the relationship between symptoms of distress and perception of control by self, others, and God/Higher Power of past, present, and future collision-related events.

Subjects were 100 English speaking adult inpatients, 16 years and older, who were less than 3 weeks post-injury, and receiving some rehabilitation. Participants completed a questionnaire which included the Center for Epidemiologic Studies Depression Scale (CES-D), Beck Anxiety Inventory (BAI), and Davidson Trauma Scale (DTS) as well as questions regarding demographics, details of the collision/injury, alcohol/drug use, pain, past and present stressors, social support, and perceptions of life change. Information about head injury and collision-concurrent alcohol and/or drug use was collected from the patient's medical chart.

Compared to other traumatic experiences (e.g., physical/sexual abuse, war combat), transportation-related collisions share the characteristics of being sudden, unexpected, relatively brief in duration, and potentially lethal. Prior studies used diagnostic interviews to identify

psychological distress in post hospitalized collision survivors. This study used questionnaire-based depression, anxiety, and trauma symptom inventories in a currently hospitalized sample and included head injured patients.

As hypothesized there was a significant correlation between the CES-D total score and the BAI total score [Hypothesis 1], the DTS total score [Hypothesis 2], and collision concurrent alcohol and/or drug use (as indicated by medical chart records or score on the CAGE) [Hypothesis 3]. Further, there was a significant correlation between the patient's self-reported history of depression, anxiety, or stress reaction and CES-D, BAI, and DTS total scores, respectively [Hypothesis 4].

Also as hypothesized, perceived personal control of the past "events that caused the collision" was significantly correlated with the CES-D total score [Hypothesis 5] while perceived control of the present "life in general right now" was negatively correlated to the CES-D total score [Hypothesis 6]. Contrary to hypothesis, perceived control of the present "recovery process right now" was not correlated to the CES-D total score [Hypothesis 6] nor was perceived control of the future "preventing a collision like this from happening...again" [Hypothesis 7]. Perception of control by "others" of the present "recovery process right now" was negatively correlated to the CES-D total score. Results support the theory that perceived personal control of past traumatic events increases the likelihood of psychological distress. Some evidence of post traumatic growth was found.

Copyright 2007

by

Quinn M. Biggs

## ACKNOWLEDGEMENTS

I wish to thank Martha Bloodgood, Ph.D. whose contributions to the development of the questionnaire were invaluable.

I also wish to thank the many patients who participated in this study, some of whom were in acute discomfort at the time of participation. Their efforts, given freely at a time of personal difficulty, are appreciated.

## TABLE OF CONTENTS

	Page
LIST OF TABLES .....	vii
LIST OF FIGURES .....	viii
 Chapter	
1. INTRODUCTION .....	1
The Problem and the Purpose of the Study .....	1
2. DEFINITION OF TERMS .....	3
Transportation-Related Collision .....	3
Trauma .....	3
Trauma-Related Psychiatric Disorders .....	4
Major Depressive Disorder .....	4
Generalized Anxiety Disorder .....	5
Acute Stress Disorder .....	7
Posttraumatic Stress Disorder .....	8
Dissociation .....	10
3. LITERATURE REVIEW .....	12
The Dangers of Transportation .....	12
Injuries and Fatalities by Transportation Type .....	12
Risk Factors for Transportation-Related Collision .....	13
Transportation-Related Collisions and Psychopathology .....	14
Pre- and Post-Collision Risk Factors .....	16
The Course of PTSD .....	18
Head Injury .....	19
Physical and Emotional Reactions to a Collision .....	20
The Stress Response System .....	20
Collision-Related Dissociation .....	21
Traumatic Amnesia .....	21
Perception of the Event as Traumatic .....	23
The Importance of Assessment and Treatment .....	24
Identifying Distress .....	24
Social Support .....	24
Posttraumatic Growth .....	24
Perception of Control of Collision-Related Events .....	25
4. PURPOSE, ELEMENTS OF DESIGN, AND HYPOTHESES .....	29
Purpose .....	29
Hypotheses .....	31

5. METHOD .....	33
Participants .....	33
Materials .....	33
Beck Anxiety Inventory .....	33
CAGE .....	34
Center for Epidemiologic Studies Depression Scale.....	35
Davidson Trauma Scale.....	36
Glasgow Coma Scale.....	37
Medical Records.....	37
Demographic Questionnaire.....	38
Design and Procedure .....	38
6. RESULTS .....	40
Overview of the Results .....	40
Descriptive Statistics .....	40
CES-D, BAI, and DTS Symptom Inventory Scores .....	58
Statistical Examination .....	63
Preliminary Analyses .....	63
Hypothesis Testing .....	63
Other Exploratory Analyses .....	66
7. DISCUSSION .....	67
Overview of the Study .....	67
Characteristics of the Sample .....	67
Demographics.....	67
Alcohol and Drug Use.....	69
Head Injury.....	69
Posttraumatic Growth.....	70
Characteristics of the Collision.....	71
Type of Transportation.....	71
Seatbelt and Helmet Use .....	72
Characteristics of the Traumatic Event .....	72
Measures of Distress.....	74
Depression Inventory .....	74
Anxiety Inventory.....	75
Trauma Inventory .....	75
Estimated Rates of Distress.....	76
Comorbidity in Measures of Distress .....	76
Relationships between Prior and Current Distress .....	77
Depression.....	78
Anxiety .....	80
Trauma.....	82
Perception of Control.....	83
Personal Control of Past Events .....	83

Personal Control of Present Events .....	84
Personal Control of Future Events .....	86
Control by Others and God/Higher Power .....	87
Elements of the Research Design .....	88
Hospitalization and the Recently Injured Sample .....	88
Use of a Questionnaire .....	90
Sudden vs. Prolonged or Expected Trauma .....	91
Inclusion of Head Injury Patients .....	91
Multiple Agent and Temporal Perceived Control .....	92
General and Theoretical Implications.....	92
Limitations.....	93
Internal and External Validity and Generalizability .....	95
Summation.....	96
Future Directions .....	97
APPENDIX A: QUESTIONNAIRE.....	101
APPENDIX B: SUBJECT RECRUITMENT NOTICE .....	111
APPENDIX C: CONSENT FORM .....	113
APPENDIX D: HIPAA AUTHORIZATION.....	117
REFERENCES .....	120



## LIST OF TABLES

Table 1 Sample Continuous Statistics: Number of Responses, Means, Standard Deviations, and Ranges .....	41
Table 2 Percentage of Collisions by Age Group Compared to National Collision Fatality Statistics.....	42
Table 3 Racial/Ethnic Background Compared to Illinois and National Statistics .....	42
Table 4 Educational Attainment Compared to National Statistics .....	43
Table 5 Household Income Compared to Illinois Statistics.....	44
Table 6 Type of Transportation Compared to National Motor Vehicle Injury and Fatality Statistics.....	45
Table 7 Seatbelt and Helmet Usage Compared to National Statistics .....	46
Table 8 Extreme Fears, Description and Frequency .....	53
Table 9 Stressful Events in the 12 Months before the Collision, Description and Frequency .....	54
Table 10 Stressful Events Prior to 12 Months before the Collision, Description and Frequency	55
Table 11 Number of Patients and Possible Distress Condition by History of Serious Depression, Depression at Time of Collision, and High Depression Inventory (CES-D) Score .....	59
Table 12 Number of Patients and Possible Distress Condition by History of Serious Prolonged Anxiety, Anxiety at Time of Collision, and High Anxiety Inventory (BAI) Score .....	61

## LIST OF FIGURES

Figure 1 Perception of Self Control of Temporal Collision-Related Events .....	48
Figure 2 Perception of Others' Control of Temporal Collision-Related Events .....	49
Figure 3 Perception of God/Higher Power's Control of Temporal Collision-Related Events .....	50
Figure 4 Level of Pain Experienced on Average since the Collision .....	51
Figure 5 Center for Epidemiological Studies Depression Scale (CES-D) Total Score Distribution .....	59
Figure 6 Beck Anxiety Inventory (BAI) Total Score Distribution .....	60
Figure 7 Davidson Trauma Scale (DTS) Total Score Distribution.....	62

# CHAPTER 1

## INTRODUCTION

### The Problem and the Purpose of the Study

Every year thousands of people are seriously injured or killed in transportation-related collisions. Prior research has shown that collision survivors often experience psychological distress as a result of the collision and physical trauma. Distress may be short-lived or chronic, debilitating, and can interfere with physical recovery and return to a pre-collision lifestyle.

The broad purpose of this study was to contribute to the knowledge base of trauma assessment and treatment, more specifically, trauma related to a means of transportation (e.g., automobile, motorcycle, train, airplane, bicycle, etc.). Some of the important questions in this area of study are: 1) What are the characteristics of the collision survivors, the events they experienced, or the injuries they sustained that lead to psychological problems? 2) What kinds of psychological problems do collision survivors have? 3) How and when can one identify those who are having problems or those who are likely to have problems in the future? 4) Once identified, what are the best methods of intervention? Currently, there is insufficient information to fully answer any of these questions.

The major goals of this study were to: 1) use a questionnaire as opposed to a typical diagnostic interview, 2) confirm that psychological distress (e.g., depression, anxiety, or posttraumatic stress symptoms) is present in currently hospitalized transportation-related collision survivors and to provide rates of distress (e.g., morbidity, the estimated number of collision survivors who are depressed), 3) confirm that different types of distress co-occur (e.g., comorbidity), 4) determine if distress is more likely to occur in those who have had prior

distress, 5) explore the relationship between symptoms of distress and perception of control by self, others, and God/Higher Power of past, present, and future collision-related events. Specific hypotheses will be noted later.

It was anticipated that by obtaining these goals there would be a better understanding of post-collision psychological distress including how characteristics of the survivor, their injuries, and their perceptions of the experience contribute to distress. It is hoped that with the information gained in this study and that of future studies, early and appropriate interventions will be developed to help distressed collision survivors achieve full recovery and psychological well being.

## CHAPTER 2

### DEFINITION OF TERMS

#### Transportation-Related Collision

The subjects in this study were involved in transportation-related collisions. The word transportation is defined as: 1) the act or an instance of transporting, 2) the state of being transported, 3) a means of conveyance, 4) the business of conveying passengers or goods, 5) a charge for public conveyance; fare, or 6) deportation to a penal colony (American Heritage Dictionary, n.d.).

The word collision is defined as: 1) A brief event in which two or more bodies come together, 2) an accident resulting from violent impact of a moving object, or 3) a conflict of opposed ideas or attitudes or goals; a collision of interests (WordNet 2.1., n.d.).

For purposes of this study a transportation-related collision is defined as a brief and violent impact involving one or more means of conveyance. This definition includes such events as a crash involving one or more automobiles, trucks, taxis, buses, motorcycles, all terrain vehicles (ATV), pedal-cycles, trains, airplanes, watercraft, or other means of conveyance, or a pedestrian being struck by one of the aforementioned.

While motor vehicle collisions are commonly referred to as accidents, this term is not always appropriate as it implies the event is unexpected, unintentional, and by chance, however, not all collisions are so (e.g., an act of anger, intent to hurt, suicide attempt).

#### Trauma

Trauma may be defined as any experience that by its occurrence has threatened the health or well being of the individual (Brewin, Dalgleish, & Joseph, 1996). Some authors have

suggested that trauma involves a violation of basic assumptions connected with survival as a member of a social group (Horowitz, 1986; Janoff-Bulman, 1992). These assumptions include the ability to meet internal moral standards and achieve major life goals, status in a social hierarchy, personal invulnerability from disease or death, the continued availability and reliability of attachment figures, and the existence of an orderly relation between actions and outcomes (Brewin et al., 1996). Events that violate these assumptions frequently involve indications that the world is uncontrollable or unpredictable (Foa, Zinbarg, & Rothbaum, 1992).

### Trauma-Related Psychiatric Disorders

Post-collision psychological distress may include one or more psychiatric disorders or symptoms of psychiatric disorders such as major depressive episode (MDE), which may also be known as major depressive disorder (MDD), generalized anxiety disorder (GAD), acute stress disorder (ASD), and posttraumatic stress disorder (PTSD). The following definitions and descriptions of these disorders are primarily from the American Psychiatric Association's *Diagnostic and Statistical Manual of Mental Disorders*, 4th ed. (DSM-IV, 1994). Details of the relationships between these disorders and transportation-related collisions will be described later.

#### Major Depressive Disorder

Major depressive disorder (MDD) is characterized by one or more major depressive episodes (MDE). A MDE is defined as a period during which there is either depressed mood or the loss of interest or pleasure in nearly all activities. The individual must also experience at least four additional symptoms including changes in psychomotor activity, sleep, and appetite or weight; decreased energy; feelings of worthlessness or guilt; difficulty thinking, concentrating,

or making decisions; or recurrent thoughts of death or suicidal ideation. The symptoms must persist for most of the day, nearly every day, for at least two consecutive weeks. The episode must be accompanied by clinically significant distress or impairment in social, occupational, or other important areas of functioning and may not be due to the direct physiological effects of a substance (e.g., drug of abuse, medication, or toxin), a general medical condition, or is not better accounted for by another psychiatric disorder (*DSM-IV*, 1994).

Individuals with a MDE frequently present with tearfulness, irritability, brooding, obsessive rumination, anxiety, phobias, excessive worry over physical health, and complaints of pain. Symptoms of a MDE usually develop over days to weeks and if left untreated may last for six months or longer. An episode is considered to have ended when the full criteria for the depressive episode have not been met for at least two consecutive months (*DSM-IV*, 1994).

Depressive episodes occur twice as frequently in women as in men. The lifetime risk for MDD in community samples has varied from 10-25% for women and from 5-12% for men with rates highest for persons 25- to 44-years-old. Prevalence rates appear to be unrelated to ethnicity, education, income, or marital status (*DSM-IV*, 1994). Depressive episodes often follow psychosocial stressors (e.g., the death of a loved one, divorce, or separation) and are often comorbid with anxiety disorders (e.g., generalized anxiety, PTSD, panic, or obsessive-compulsive disorders), substance-related disorders, eating disorders (e.g., anorexia nervosa or bulimia nervosa), and borderline personality disorder (*DSM-IV*, 1994).

### Generalized Anxiety Disorder

Generalized anxiety disorder (GAD) is defined as excessive anxiety and worry (apprehensive expectation) about a number of events or activities occurring more days than not

for a period of at least six months. The anxiety and worry are accompanied by at least three additional symptoms from a list that includes restlessness, being easily fatigued, having difficulty concentrating, irritability, muscle tension, and disturbed sleep. GAD is not better accounted for by another psychiatric disorder or confined to features of another psychiatric disorder (e.g., panic disorder, social phobia, or other anxiety disorders) and the anxiety and worry do not occur exclusively during PTSD. Also, symptoms are not due to the direct physiological effects of a substance (e.g., drug of abuse, medication, or toxin) or general medical condition. Although individuals with GAD may not always identify the worries as excessive, they report subjective distress due to constant worry, have difficulty controlling the worry, or experience impairment in social, occupational, or other important areas of functioning (*DSM-IV*, 1994).

Adults with GAD often worry about everyday, routine life circumstances such as job responsibilities, finances, the health and/or misfortune of family members, or more minor matters such as household chores, car repairs, or being late for appointments. The intensity, duration, or frequency of the anxiety and worry is far out of proportion to the actual likelihood or impact of the feared event. The person finds it difficult to keep worrisome thoughts from interfering with attention to tasks at hand and has difficulty stopping the worry (*DSM-IV*, 1994).

GAD often begins in childhood or adolescence, but onset after age 20 is not uncommon. The lifetime prevalence rate is approximately 5% and it occurs twice as frequently in women as in men. The course is considered chronic and worsens at times of stress. Comorbid disorders include mood disorders (e.g., major depressive disorder), other anxiety disorders (e.g., panic disorder, social phobia), substance-related disorders, and conditions that may be associated with stress (*DSM-IV*, 1994).



## Acute Stress Disorder

Acute stress disorder (ASD) is defined as the development of characteristic dissociation (defined below), anxiety, and other symptoms that occur within one month after exposure to an extreme traumatic stressor. An extreme traumatic stressor is defined as direct personal experience of an event that involves actual or threatened death or serious injury, or threat to one's physical integrity; or witnessing an event that involves death, injury, or a threat to the physical integrity of another person; or learning about unexpected or violent death, serious harm, or threat of death or injury experienced by a family member or other close associate. The person's response to the event must involve intense fear, helplessness, or horror (*DSM-IV*, 1994).

Either while experiencing the traumatic event or after the event, the individual has at least three of the following dissociative symptoms: a subjective sense of numbing, detachment, or absence of emotional responsiveness (considered one symptom), a reduction in awareness of his or her surroundings, derealization, depersonalization, or dissociative amnesia. Following the trauma, the traumatic event is persistently re-experienced, the individual displays marked avoidance of stimuli that may arouse recollections of the trauma, and has marked symptoms of anxiety or increased arousal. Symptoms must last for at least two days and resolve within four weeks after the conclusion of the traumatic event. The symptoms must cause clinically significant distress, significantly interfere with normal functioning, or impair the individual's ability to pursue necessary tasks. The symptoms are not due to the direct physiological effects of a substance (e.g., drug of abuse, medication, or toxin), a general medical condition, and are not better accounted for by another psychiatric disorder (*DSM-IV*, 1994).

ASD symptoms may include despair, hopelessness (depressive symptoms), and risk-taking behavior. If the trauma led to another's death or serious injury, survivors may feel guilt

about having remained intact or about not providing enough help to others. Individuals with this disorder often perceive themselves as having greater responsibility for the consequences of the trauma than is warranted. The prevalence of ASD in a population exposed to serious traumatic stress depends on the severity and persistence of the trauma and the degree of exposure to it. Individuals with ASD are at increased risk for the development of PTSD and when symptoms persist beyond one month, a diagnosis of PTSD may be appropriate (*DSM-IV*, 1994). Some have suggested that ASD and PTSD should be combined into a single disorder that includes subgroups of acute and chronic symptoms (Bremner, 1999).

#### Posttraumatic Stress Disorder

Posttraumatic stress disorder (PTSD) is defined as the development of characteristic symptoms following exposure to an extreme traumatic stressor (an extreme traumatic stressor was defined under ASD). The characteristic symptoms include persistent re-experiencing of the traumatic event (criterion B), persistent avoidance of stimuli associated with the trauma and numbing of general responsiveness (criterion C), and persistent symptoms of increased arousal (criterion D). The full symptom picture must be present for more than 1 month and the disturbance must cause clinically significant distress or impairment in social, occupational, or other important areas of functioning (*DSM-IV*, 1994). In prior studies the prevalence of PTSD has ranged from 1.0% to 2.6% in various United States communities (Davidson, Hughes, Blazer, & George, 1991; Helzer, Robins, & McEvoy, 1987; Shore, Vollmer, & Tatum, 1989).

According to the *DSM-IV* (1994), an individual's level of exposure to and involvement in a traumatic event is the most important factor in the likelihood of developing PTSD. Yet most people who experience a traumatic event do not develop PTSD (Yehuda & McFarlane, 1995). In

fact, many studies have shown that while exposure to a traumatic event is a necessary trigger, it may be a less predictive factor for the development of PTSD than the individual's psychiatric history (McFarlane, 1989; Weisaeth, 1984). Consistent with this, Ursano et al. (1999) found that having a history of PTSD increases the risk for subsequent PTSD by 6.8 to 8.0 times.

In a comprehensive meta-analytic review of risk factors for PTSD in trauma-exposed adults, Brewin, Andrews, and Valentine (2000) found three categories of pre-trauma risk factors for PTSD. First, factors such as gender, age at trauma, and race predict PTSD in some populations, but not in others. Second, factors such as education, previous trauma, and general childhood adversity predict PTSD more consistently, but to a varying extent according to the populations studied and the methods used. Third, factors such as personal psychiatric history, family psychiatric history, and reported childhood abuse have more uniform predictive effects. However, overall these authors found that factors operating during or after the trauma, such as trauma severity, lack of social support, and additional life stress, had somewhat stronger effects than pre-trauma factors. They caution that trying to identify a common set of pre-trauma predictors of PTSD that will be valid across different traumatized groups is premature. Incidentally, of the 77 articles included in Brewin et al.'s meta-analytic review, only 4 specifically included subjects involved in transportation-related traumas.

There is a very high degree of comorbidity between PTSD and other disorders. An epidemiological study of psychiatric diagnoses among the general United States population revealed that 16% of persons with PTSD have one other psychiatric diagnosis, 17% have two other psychiatric diagnoses, and nearly 50% have three or more additional psychiatric diagnoses (Kessler et al., 1995). In other studies it was found that persons with PTSD are 20 times more likely to have had diagnoses of panic disorder, somatization disorder, schizophrenia, or

schizophreniform disorder; 10 times more likely to have had diagnoses of GAD, MDD, social phobia, or obsessive-compulsive disorder (Davidson et al., 1991); and two to three times more likely to have had a substance use disorder (alcohol or drugs) than those without PTSD (Kessler et al., 1995). It is not known to what extent these comorbid disorders precede or follow the onset of PTSD (*DSM-IV*, 1994) and some authors have noted that there is poor diagnostic specificity between PTSD and other disorders (Brady, 1997; Kulka et al., 1990).

Rates of comorbidity may be even higher in populations that are exposed to very extreme and prolonged trauma. For example, 75% of male Vietnam veterans with PTSD had a comorbid diagnosis of alcohol abuse or dependence, 44% had a diagnosis of GAD, and more than 20% had a diagnosis of MDD, dysthymia, or antisocial personality disorder. Female Vietnam veterans with PTSD had similarly high comorbidity, but with higher rates of depression and lower rates of antisocial personality disorder (Kulka et al., 1990).

Individuals with PTSD are at risk for more than just comorbid psychological problems. They are also more likely to have chronic medical illnesses including bronchial asthma, peptic ulcers, and hypertension and are 14.9 times more likely to attempt suicide than individuals without PTSD (Davidson et al., 1991). In a sample of burn patients, those with PTSD were more likely to report higher levels of pain than did patients without PTSD, despite receiving equivalent doses of analgesic medication (Perry, Cella, Falkenburg, Heidrich, & Goodwin, 1987).

## Dissociation

Dissociation is defined as a lack of normal integration of thoughts, feelings, and experiences into the stream of consciousness and memory (Bernstein & Putnam, 1986). While dissociation is not a specific disorder, dissociative symptoms are included in the diagnostic

criteria for ASD and PTSD and are often good predictors for the later development of chronic PTSD (Bremner & Brett, 1997; Bremner, Southwick, Brett, Fontana, Rosenheck, & Charney, 1992; Koopman, Classen, & Spiegel, 1994; Marmar et al., 1994; Shalev, Peri, Canetti, & Schreiber, 1996).

While it is not unusual for “normal” individuals to have mild transient dissociative feelings, especially during adolescence (Myers & Grant, 1970), there is a strong link between traumatic experiences and the development of dissociative symptoms (Putnam, 1985). Three types of trauma dissociation are common: 1) experiences of unreality or detachment from the self and the physical and social environments, 2) alterations in perceptual experience, and 3) memory disturbances (see Spiegel and Cardena, 1991 for a review).

## CHAPTER 3

### LITERATURE REVIEW

#### The Dangers of Transportation

The need to travel is a routine part of daily life. Yet traveling can be dangerous with serious and sometimes lethal consequences. In the United States deaths and injuries resulting from vehicular collisions are the leading cause of death for persons of every age from 3 through 33 (based on 2003 data, National Highway Traffic Safety Administration's [NHTSA] National Center for Statistics and Analysis, 2006). In fact, most Americans will be involved in a motor vehicle collision at some time in their lives and one quarter of those collisions will result in serious injuries (Kessler et al., 1995).

#### Injuries and Fatalities by Transportation Type

In 2005, there were 6,159,000 police-reported motor vehicle traffic collisions in the United States in which 2,699,000 people were injured and 43,443 were killed (NHTSA, 2006). Of those killed, 18,440 (42%) were in passenger cars, 12,975 (30%) in light trucks, 803 (2%) in large trucks, 58 (0.1%) in buses, 4553 (10%) on motorcycles, 4,881 (11%) were pedestrians, 784 (2%) were pedal-cyclists, and 949 (2%) were in other or unknown vehicle types. Seatbelt use, which has a compliance rate of 82%, is estimated to have saved the lives of 15,632; an estimated 5,328 additional lives could have been saved had seat belts been worn (NHTSA, 2006).

Motorcycle collisions are extremely dangerous. In 2005, 87,000 motorcyclists were injured and 4553 were killed. Per vehicle mile, motorcyclists are 34 times more likely than passenger car occupants to die in a traffic collision (NHTSA, 2006). Helmet use, which has a

compliance rate of 48%, is estimated to have saved the lives of 1,546 lives; an estimated 728 additional lives could have been saved had helmets been worn (NHTSA, 2006).

Travel by rail can also be dangerous. In 2005, there were 13,969 rail accidents/incidents that included train accidents, highway-rail incidents, and other incidents. Together they resulted in 9,172 injuries and 888 fatalities, rates that appear typical when compared to 2002-2004 data (US Department of Transportation, Federal Railroad Administration, 2006).

Boating also carries a risk for injury or death. In 2004, there were 4,904 boating “accidents” resulting in 3,363 injuries and 676 deaths (US Coast Guard, 2005). Open motorboats accounted for the majority of accidents (42%) followed by personal watercraft (25%) and cabin motorboats (15%). Of the 484 who drowned, 90% were not wearing a life jacket; an estimated 431 of those lives could have been saved had a life jacket been worn (US Coast Guard, 2005).

Air travel is one of the safest means of travel, although in 2005 there were 32 accidents and 22 fatalities. According to the Air Transportation Association (2007), accident and fatality rates in prior years have been higher (e.g., 1974, 42 accidents, 460 fatalities) as well as lower (e.g., 1980, 15 accidents, 1 fatality). Injury rates were not available for every means of transportation included in this study (e.g., air travel), although it is expected that injury rates generally follow distribution patterns similar to those of fatalities.

### Risk Factors for Transportation-Related Collision

Two of the greatest risk factors for transportation-related collision are being young and being male. In 2005, 16- to 24-year-olds represented 24% of all traffic fatalities compared with 5% for age 15 and under, 46% for ages 25 to 54, and 25% for ages 55 and over (NHTSA, 2006). Males accounted for 70% of all traffic fatalities, 70% of all pedestrian fatalities, and 87% of all

pedal-cyclist fatalities (NHTSA, 2006). Further, 91% of the motorcyclist deaths in 2000 were males (Insurance Institute for Highway Safety, Highway Loss Data Institute [IIHS-HLDI], 2002).

Use of alcohol and/or drugs is also a risk factor for collisions. It is estimated that in 2005 alcohol was involved in 7% of all motor vehicle collisions and in 39% of fatal motor vehicle collisions. In 2004 over 1.4 million drivers were arrested for driving under the influence of alcohol or narcotics. Twenty-seven percent of motorcycle operators involved in a fatal collision had blood alcohol levels at or above the typical legal limit of 0.08 g/dL (NHTSA, 2006). Alcohol was also involved in approximately one-third of all boating fatalities (US Coast Guard, 2005).

Other risk factors for collision include: single marital status, education of less than 12 years, employment as an unskilled or semiskilled laborer, alcohol dependence, being over 70-years-old, having dementia or an antisocial personality, and experiencing a recent severe stressor (Hyman, 1968; IIHS-HLDI, 2002; Noyes, 1985).

### Transportation-Related Collisions and Psychopathology

Traffic collisions may be the most common cause of posttraumatic stress disorder (PTSD) symptoms in the general population (Mayou, Bryant, and Duthie, 1993). They have replaced trauma due to the Vietnam War as the primary cause of PTSD (Norris, 1992). In fact, transportation-related trauma is so common that “severe automobile accident” is cited as an example of a traumatic stressor in the *DSM-IV* (1994) diagnostic criteria for PTSD.

Multiple studies have linked automobile collisions to the development of PTSD (Barton, Blanchard, & Hickling, 1996; Blanchard, & Hickling, 1997; Brom, Kleber, & Hofman, 1993; Bryant & Harvey, 1996; Di Gallo & Parry-Jones, 1996; Green, McFarlane, Hunter, & Griggs,



1993; Kuch, Cox, & Evans, 1996). Estimates of the incidence of PTSD following motor vehicle collisions range from 9-100% and many collision survivors are reported to have PTSD-like reactions (e.g., *partial PTSD*, see below; Blanchard & Hickling, 2004; Goldberg & Gara, 1990; Hickling & Blanchard, 1992; Hickling, Blanchard, Silverman, & Schwartz, 1992; Kessler et al., 1995; Kuch, Swinson, & Kirby, 1985). Such disparate rates of incidence may reflect differences in time intervals between the collision and the research evaluation (Delahanty et al., 1997) or variation in the definition of trauma symptoms.

Some studies have used the terms subsyndromal, partial, subclinical, or borderline PTSD to describe the presence of PTSD symptoms that do not meet full PTSD diagnostic criteria. For example, Blanchard, Hickling, Vollmer, et al. (1995) used the term subsyndromal PTSD to describe transportation collision survivors who were positive for PTSD symptom Criterion B (re-experiencing) and either Criterion C (avoidance and numbing) or Criterion D (hyperarousal), but not both. Green et al. (1993) used the terms borderline or subclinical if collision survivors were positive for any two of the three PTSD criteria.

Other forms of psychological distress are also common. Mayou et al. (1993) studied 188 vehicle collision survivors and found that 41% reported clinically significant levels of anxiety or depression 1-54 days post-collision. Goldberg and Gara (1990) investigated patients referred for psychiatric consultation following automobile collisions and found that major depressive disorder (MDD) was three times as common as PTSD in their sample. They concluded that the collisions may have been capable of triggering depression in certain patients, but were not traumatic enough to induce PTSD.

Smith, North, McCool, and Shea (1990) interviewed 46 survivors of a plane crash within four to six weeks of the event. They found that more than half the subjects met criteria for one

psychiatric disorder and many met criteria for more than one. Diagnoses included MDD (41%), PTSD (22%), generalized anxiety disorder (GAD) (20%), and alcohol abuse/dependence (13%). PTSD occurred in conjunction with one of the other non-alcohol diagnoses (e.g., MDD or GAD) four times more frequently than it did alone. GAD occurred in conjunction with another non-alcohol diagnosis eight times more frequently than it did alone. Subjects who were abusing alcohol almost always met the criteria for at least one of the other diagnoses, but MDD was the most likely of the disorders to occur in the absence of another non-alcohol diagnosis.

#### Pre- and Post-Collision Risk Factors

Some pre- and post-collision factors have been found to increase the risk for developing posttraumatic distress. Pre-collision factors include a history of traumatic experiences (e.g., physical or sexual abuse as a child; Blanchard, Hickling, & Taylor, 1995; Di Gallo & Parry-Jones, 1996) and a history of underlying psychological problems (Blanchard & Hickling, 1997; Chubb & Bisson, 1996; Kuch et al., 1996). In the previously mentioned study by Smith et al. (1990), more than two-thirds of the cases of post-disaster disorders could be predicted by identifying subjects who had a pre-disaster psychiatric history.

As a means of assessing the relationship between prior psychological problems and collision-related trauma, Chubb and Bisson (1996) studied the incidence of PTSD in a group of mentally ill adults who were in a motor vehicle collision. They found that 10 of the 20 collision survivors developed PTSD. Upon dividing the sample into groups by pre-collision diagnosis (anxiety disorders, depressive disorders, or chronic schizophrenia), they found that those with anxiety or depressive disorders displayed more trauma symptoms compared to the schizophrenic group. While this study had a small sample size and there was a high incidence of PTSD as a

whole, the results suggest that some psychiatric disorders (e.g., anxiety and depression) are more likely to lead to poorer psychological functioning following a motor vehicle collision.

Peri- or post-collision factors that increase the risk for developing posttraumatic distress include financial difficulties (Bryant & Harvey, 1996), greater psychological distress during hospitalization, a positive alcohol/drug screen at the time of injury, younger age, and a lack of anticipating problems returning to normal (Richmond and Kauder, 2000; 53% of their sample were collision-related traumas).

Wu and Cheung (2006) assessed posttraumatic stress symptoms in 596 motor vehicle collision survivors. They found that 5-20% of the sample had a significant level of posttraumatic stress in one or more of the PTSD symptom clusters. Factors that predicted high posttraumatic stress scores were a high level of perceived threat, female gender, severe physical injury, an intention to initiate legal litigation, and more days of sick leave.

Not all studies identified the same pre- and post-collision risk factors. Gregg et al. (1995) interviewed 68 survivors of the Kegworth Air Disaster. They found that within one year of the disaster 79% met the criteria for a psychiatric disorder; 50% had PTSD and 33% had major depression (using diagnostic criteria from the American Psychiatric Association, *Diagnostic and Statistical Manual of Mental Disorders*, 3rd ed., revised, [DSM-III-R], 1987). Those with PTSD were more likely to have been younger, more severely injured, and exposed to injured or dead passengers. Contrary to other studies, whether or not survivors feared they would die did not predict PTSD and there was no association between the development of PTSD and a previous personal or family history of psychiatric disorder.

## The Course of PTSD

There is insufficient evidence to clearly define the course of PTSD in collision survivors. Variation in assessment methods and the length of time to follow up may contribute to the lack of clarity. It is generally thought that symptoms of PTSD tend to decline with time. For example, Blanchard, Hickling, Vollmer, et al. (1995) followed the symptoms of PTSD in 98 motor vehicle collision victims for six months post-injury. Of the 40 victims who initially met full diagnostic criteria for PTSD, 10 no longer met the criteria 4 months later and 20 no longer met the criteria at 6 months. Symptom declines were similar for those with full or subsyndromal PTSD.

There have been some conflicting findings regarding the decline of posttraumatic symptoms. Blanchard, Hickling, Vollmer, et al. (1995) found that symptoms of avoidance and numbing (criterion C) were most likely to show a significant decline at 6 months, whereas hyperarousal symptoms (criterion D) did not significantly decline. In contrast, Wu and Cheung (2006) found that symptoms of hyperarousal (criterion D) and intrusion (criterion B) showed a decline over time while avoidance symptoms (criterion C) remained unchanged.

There is strong evidence that more numerous and more severe symptoms during the initial phase of PTSD predict a more chronic course (Blanchard, Hickling, Vollmer, et al., 1995; Mayou et al., 1993; Ursano et al., 1999). For example, Wu and Cheung (2006) found that survivors with significant acute stress symptoms one week after a collision were more likely to develop chronic posttraumatic distress. Similarly, Green et al. (1993) found that subjects with higher measures of psychological distress one month after a collision had significantly higher levels of disability 18 months later, particularly in the areas of social functioning, alertness, and emotional functioning. Regardless, factors such as chronic physical disability (Kuch et al., 1996)

and involvement in collision-related litigation (Blanchard & Hickling, 1997) are generally associated with chronic symptoms of PTSD.

Interestingly, while many prior studies found psychiatric illness and/or treatment were linked to the development of post-collision distress, Wu and Cheung (2006) found that previous psychiatric consultations predicted a faster drop in measures of posttraumatic distress. They suggest that having a history of psychiatric consultation may imply accessibility to mental health services and a readiness to seek help.

## Head Injury

Motor vehicle collisions are the most common cause of head injuries, accounting for over 50% of all mild head injuries (Bernstein, 1999). A Mild Head Injury (MHI) is defined as any traumatic injury to the head and face. A mild Traumatic Brain Injury (TBI) is a subset of MHI in which a disruption of brain function (brain damage) is evident (Kay, Newman, Cavallo, Ezrachi, & Resnick, 1992). MHI by itself does not imply brain damage.

The typical criteria for a diagnosis of MHI includes one or more of the following: a Glasgow Coma Scale (GCS) rating of 13-15 upon hospital admission (Teasdale & Jennett, 1974), absence of a skull fracture or focal brain lesion, normal neurological examination, unconsciousness of less than 30 minutes, and posttraumatic amnesia of less than 24 hours (Bernstein, 1999). Head injury can result in symptoms that include irritability, anger outbursts, depression, anxiety, inflexibility, more assertive and/or less diplomatic behavior than normal, a lack of social inhibition, personality changes, and poor social functioning (Kay et al., 1992; Nordhoff, 1996).

## Physical and Emotional Reactions to a Collision

### The Stress Response System

Traumatic events activate the body's stress response system. Normally the stress response system is adaptive, meant to help preserve life and limb at times of threat or danger. In a typical stress response hormones such as adrenaline and cortisol are temporarily released and assist the body in reacting to the threat or danger. However, when an individual is exposed to a single extreme stressor or to repeated stressful events, the stress response system may become hyperaroused and pathological. The brain may become threat-sensitized, a condition where the traumatic event is remembered and the body over-reacts when faced with a new stressor (Schwarz & Perry, 1994). Hyperarousal may be evident at a neurobiological level as abnormal levels of stress hormones or as a change in the number or sensitivity of receptors to these substances (Yehuda, 1998). Hyperarousal can make victims of prior trauma more vulnerable to subsequent stressors (McCarty & Gold, 1996). For example, Bremner, Southwick, Johnson, Yehuda, and Charney (1993) found Vietnam veterans with a history of childhood physical abuse were more likely to have combat-related PTSD (26%) compared to those without abuse (7%).

Traumatic experiences may also cause changes in the structure and function of the brain. High levels of stress hormones, similar to what might occur naturally during a traumatic event, are associated with damage to the hippocampus (Luine, Villages, Martinex, & McEwen, 1994), which is thought to be the anatomic location of memory problems (Bremner, Krystal, Charney, & Southwick, 1996a). According to Bremner (1999), patients with PTSD exhibit a variety of memory problems including deficits in declarative memory (e.g., remembering facts or lists) and non-declarative memory (e.g., motor memory such as how to ride a bike), as well as fragmentation of memories.

Ironically, long after a traumatic event, individuals with PTSD typically have lower than normal levels of stress hormones, but hyper-respond to their environment. In contrast, individuals with depression show similar hippocampal damage and cognitive deficits, but have higher than normal levels of stress hormones and hypo-respond to their environment (Yehuda, 1999; Yehuda, Teicher, Levengood, Trestman, & Seiver, 1996). It is not known whether elevated hormone levels in depressed individuals are a cause or effect of the depression (Bremner, 1999).

### Collision-Related Dissociation

The phenomenon of traumatic dissociation following a transportation-related collision is well documented. Ursano et al. (1999) found the most common traumatic symptom, experienced by 57% of their motor vehicle collision survivors, was a change in the sense of time (time speeding up or slowing down) during the event. Survivors who reported traumatic dissociation were 4 times more likely to experience acute PTSD and 5 times more likely to develop chronic PTSD. While prior PTSD is known to increase the risk for subsequent PTSD (Blanchard & Hickling, 1997), those with traumatic dissociation were still 3.5 times more likely to develop acute PTSD, even after adjusting for prior PTSD. This suggests that prior PTSD and traumatic dissociation are independent risk factors. This is consistent with the results of Marmar et al. (1994) who found that traumatic dissociation predicts the risk of developing PTSD independent of the level of trauma exposure and general dissociative tendencies.

### Traumatic Amnesia

Some collision survivors experience amnesia, a loss of memory for the collision event. Amnesia can be a sign of serious head injury, however, it may also offer some protection from

the psychological experience (or re-experience) of the traumatic event. Cognitive theories of intrusive symptoms (e.g., flashbacks and nightmares) suggest that memories are formed at the time of the traumatic event and later these traumatic memories are involuntarily activated when triggered by relevant cues (MacLeod, 1990). Amnesia may impede the formation of memories and thereby reduce the threat sensitization of the brain making it less likely that survivors will experience intrusive recall. Indeed, in a study of collision survivors, those who experienced amnesia were less likely to develop PTSD (Mayou et al., 1993).

### Trauma-Related Symptoms

Survivors of trauma often report a variety of common symptoms. Wilkinson's (1983) study of psychiatric symptoms in 102 survivors of the 1981 Hyatt Regency Hotel skywalk collapse provides an example of typical trauma symptoms and their frequency. Symptoms included repeated recollections of the disaster (88%), sadness (83%), fatigue (57%), recurrent feelings often of anxiety or depression (54%), dreams of the disaster (52%), sleep disturbances (50%), loss of appetite (46%), loss of enthusiasm (45%), ease of startle (45%), difficulty concentrating (44%), guilt (44%), avoidance of situations that cause recall (40%), reminders of the event make things worse (37%), inability to feel deeply about anything (36%), anger (35%), loss of interest (34%), feelings of detachment (29%), memory difficulties (27%), psychosomatic complaints (18%), and diminished sexual interest (17%).

Post-trauma feelings of guilt are common (Wilkinson, 1983). Guilt is thought to arise from many sources including the initial relief at having survived, the sense that one's life was purchased at the cost of another's, guilt for those that one did not save and for actions that one failed to take, and guilt over one's behavior during the disaster (Raphael, 1986). Guilt and self-



blame may signal more serious psychological problems such as MDD (*DSM-IV*, 1994). Guilt may also lead to social withdrawal, which can hamper coping strategies that rely on support from family and friends. Joseph, Yule, Williams, & Andrews (1993) have suggested that relief from guilt may increase the seeking of social support and potentially lead to fewer psychological symptoms. Survivors who assume responsibility for the collision may also experience regret, remorse, and grief. When fatalities are involved grief reactions can be even more pronounced and may disguise underlying PTSD symptoms (Butler, Moffic, & Turkal, 1999).

#### Perception of the Event as Traumatic

Perceiving a collision as horrific or life threatening is often more important to the development of PTSD than the severity of the injuries sustained. Mayou et al. (1993) compared injury severity to psychological outcome in automobile collisions survivors. They found that PTSD, mood disorders, and travel phobia occurred as frequently in a moderately injured group as they did in a more severely injured group. Having horrific memories of the collision appeared to be the one factor that most reliably separated those who developed PTSD from those who did not. Similarly, Green et al. (1993) found that the collision survivors most at risk for developing PTSD were not those whose injuries were the most severe, but those who rated the collision as a more serious threat to their lives. Mayou et al. (1993) caution that even those who are uninjured or slightly injured can have psychological difficulties and they emphasize early intervention, information, and advice for collision victims.

## The Importance of Assessment and Treatment

### Identifying Distress

Under the immediate stress of a collision, survivors may deny or minimize psychological problems, or not yet recognize their own traumatization. They may avoid thinking, feeling, or talking about the traumatic event or feel that they will be chastised or labeled if they talk about psychological issues. Therefore, they may not convey their distress or need for help. Patients are more likely to seek help for medical concerns than they are for emotional distress (Estonia, 1993) and if psychological distress continues after hospitalization survivors may be reluctant to seek help. This suggests that assessment and interventions must begin early, while the patient is still hospitalized to help patients acknowledge and cope with traumatic distress.

### Social Support

Social support has been suggested as a way to mediate between traumatic events and posttraumatic symptoms (Solomon, 1986). Trauma survivors benefit from having others who are willing to listen and who can provide support in emotional and practical ways. While social support is known to decrease with time, those who receive more social support immediately after a traumatic event are more likely to have fewer PTSD symptoms, especially avoidance symptoms, months later (Joseph, Andrews, Williams, & Yule, 1992; Joseph et al., 1993).

### Posttraumatic Growth

Some trauma survivors report positive outcomes following a traumatic event. These may include changes in beliefs about themselves, their life philosophy, or their value system (e.g., appreciating their lives and their loved ones more than material goods), as well as feeling closer

to family members, friends, and God (North, Smith, McCool, & Lightcap, 1989). Trauma survivors who report more positive changes also tend to report fewer symptoms of PTSD (Frazier, Conlon, & Glaser, 2001).

### Perception of Control of Collision-Related Events

The idea of perceived control is a major factor in many theories of the development of PTSD. Control can be defined as the perception that an agent can intentionally produce desired outcomes or prevent undesired ones (Skinner, 1996). Perceived control can be subdivided into internal or external locus of control. Internal control is when a person attributes environmental events to himself and external control is when a person attributes them to things outside his power such as fate, luck, or the doings of other people (Strickland, 1978).

It is thought that having a perception of lack of control over self and environment during traumatic events greatly increases the likelihood of developing PTSD and other disorders. Foa et al. (1992) suggest a model for the etiology of PTSD based on animal research showing that exposure to uncontrollable and unpredictable aversive events leads to PTSD-like symptoms. Foa et al. emphasize that it is the perception of the event as less controllable and less predictable, regardless of actual controllability or predictability that is more likely to lead to the development of PTSD.

Chorpita and Barlow (1998) suggest that uncontrollable experiences early in life may lead to the development of both anxiety and depression. These authors hypothesize that experiencing uncontrollable events early in life increases the likelihood that subsequent events will also be perceived as uncontrollable, and that over time this pattern of perception is more likely to lead to the development of anxiety and depression. Studies of psychotherapy with

depressed individuals support this position because perceptions of control are known to increase as a process of the therapy (Firth-Cozens & Brewin, 1988).

In a review of perceived control research, Frazier, Berman, and Steward (2002) suggest that a temporal framework is useful for considering issues of control. The temporal model highlights three important questions facing trauma survivors: “Could I have prevented this?” (past control), “Can I prevent this in the future?” (future control), and “What can I do about the situation now?” (present control). More specifically, past control refers to the perception that the occurrence of the event itself was controllable, future control refers to perceived control over the event happening again, and present control refers to perceived control over the current impact of the event, such as current symptoms or emotions (Frazier et al., 2002).

While primary personal control is the typical control construct (Skinner, 1996), events can be perceived as controllable by others (family, friends, healthcare workers, or others) or by God/Higher Power. Considering this, one can discuss control issues in terms of a temporal framework where either the self, others, or God/Higher Power is the agent of action.

Most theories of perceived control suggest that no matter what the temporal time frame, having a perception of control leads to better adjustment while having a perception of lack of control leads to PTSD and other disorders. Strickland (1978) stated, where physical health and well being is concerned, an internal locus of control is thought to improve health because it is associated with preventive behavior, efforts to improve physical functioning, and greater resistance to physical and psychological dysfunction.

Unfortunately, perceived control is more complex; having a perception of control does not always lead to the best outcome. In a review of perceived control, Frazier et al. (2002) found that a perception of control of past events is unassociated with distress or is associated with more

distress while a perception of control of present and future events appears to be associated with less distress and better adaptation.

That past control may be associated with more distress makes sense considering that most traumatic events are not controllable, at least in that they were not intentionally produced (Skinner, 1996). Perceiving control over a traumatic event that is in fact uncontrollable is less adaptive and is likely to lead to considerably more self-blame and guilt. For example, Joseph, Brewin, Yule, and Williams (1991) studied the relationship between causal attributions and psychiatric symptoms in survivors of a capsized ferry. Even though the survivors had no control over the cause of the disaster, survivors who made more attributions of control of the capsizing and rescue of other victims reported more symptoms of PTSD, especially intrusion symptoms. Incidentally, besides self-blame being non-beneficial, blaming others for past negative events (similar to external or vicarious past control) is also associated with poorer outcomes (Tennen & Affleck, 1990).

A perception of personal control over future events is generally associated with less distress and better adjustment (Carver et al., 2000; Helgeson, 1992; Newsom, Knapp, & Schulz, 1996; Reed, Taylor, & Kemeny, 1993). For example, Frazier (2000) found consistent evidence that perceived future control was associated with fewer symptoms of anxiety, depression, and PTSD among rape victims. Studies of perception of external or vicarious future control (control by others or God/Higher Power) have found mixed results (for a review see Frazier et al., 2002).

A perception of personal control over present events is most often conceptualized in terms of control over medical issues (symptoms, medical care, treatment, recovery processes), or in terms of personal issues (emotions, daily life), and social relations (spousal reactions). No study has found present personal perception of control to be associated with poorer adjustment; it

is almost always associated with better adjustment and lower risk of PTSD (Frazier et al., 2002). These findings make sense because present issues (symptoms, medical care, recovery processes, emotions, etc.) may be more controllable than past or future events.

In summary, past control is generally either not associated with distress or is associated with more distress, future control is generally (although not always) associated with positive outcomes, and present control is nearly always beneficial (Frazier et al., 2002).

## CHAPTER 4

### PURPOSE, ELEMENTS OF DESIGN, AND HYPOTHESES

#### Purpose

The broad purpose of this study was to contribute to the knowledge base of trauma assessment and treatment. As previously stated, major goals were to: 1) use a questionnaire as opposed to a typical diagnostic interview, 2) confirm that psychological distress (e.g., depression, anxiety, or posttraumatic stress symptoms) is present in currently hospitalized transportation-related collision survivors and to provide rates of distress (e.g., morbidity, the number of survivors who are depressed), 3) confirm that different types of distress co-occur (e.g., comorbidity), 4) determine if distress is more likely to occur in those who have had prior distress, and 5) explore the relationship between symptoms of distress and perception of control by self, others, and God/Higher Power of past, present, and future collision-related events. An additional minor goal was to use limited exploratory analyses to identify possible relationships between select questions and symptom inventory scores (e.g., depression, anxiety or posttraumatic stress symptoms). It was anticipated that through the achievement of these goals transportation-related trauma and the characteristics of those who develop post-trauma distress would be better understood.

#### Elements of Design

This study differs from prior studies in several important ways. First, the subjects in this study, transportation-related collision survivors, were assessed while currently hospitalized. Most previous collision-related studies assessed survivors weeks to years after hospitalization.

Conducting assessments so long after hospitalization can be problematic because cases can be missed (e.g., lose contact with the patient) and sample bias can occur (e.g., in some cases only those with continuing problems are assessed). It was also anticipated that symptoms of anxiety, depression, and posttraumatic stress disorder (PTSD) may be more acute in a recently injured, currently hospitalized sample and that detecting distress while the collision survivor was still an inpatient may be vital to the delivery of early and appropriate interventions.

Second, this study utilized questionnaire-based depression, anxiety, and PTSD symptom inventory scales. Prior studies typically used structured diagnostic interviews to identify psychological distress in collision survivors. While personal interviews can be effective in detecting psychological distress, they can be difficult, costly, and time consuming for the health care provider. It was anticipated that a questionnaire-based assessment would reveal information similar to that of an interview but require less time, training, or expenditure on the part of the health care provider. Questionnaires are easy to administer and may be given simultaneously to a large number of subjects. Further, self-report formats also eliminate the possibility of interviewer bias and the need for assessment of inter-rater reliability.

Third, participants in this study experienced a sudden, unexpected, and brief traumatic event, which may have been perceived as life threatening. This samples' reaction to the event may be different from reactions of other research samples where traumatic experiences were more prolonged (e.g., childhood physical abuse), less lethal (e.g., childhood sexual abuse), or in some way expected (e.g., combat trauma). As all study participants were physically injured, it was expected that psychological distress would be mediated primarily by the individual's subjective response. This would be consistent with prior studies that found physical injury to be a poor predictor of PTSD when the entire sample sustained a physical injury (Green, 1994).



Fourth, this study included collision survivors with head injuries. Many prior studies have excluded the head injured (e.g., Delahanty et al., 1997) because occasionally head injury results in symptoms that resemble depression or anxiety. When assessing for symptoms of depression and anxiety, combining the data of head injured and non-head injured patients could obscure the findings. To counter such problems, data regarding the presence and severity of head injury was collected which would allow for the differential assessment of head injured and non-head injured patients.

Finally, this study contributes to the theory of perceived control by assessing the relationship between symptoms of depression and the patient's perception of control of past, present, and future collision-related events by multiple agents (self, others, or God/Higher Power). The following statement by Frazier et al. (2002) supports the need for further study of perceived control:

More research is needed on both personal and vicarious control; particularly following non-medical traumas that may in fact be uncontrollable [and] assessment of vicarious control should include agents other than health care providers [e.g., God/Higher Power]. In addition, we recommend further research regarding how different aspects of control are related to various forms of posttraumatic distress [e.g., depression].

### Hypotheses

There were seven specific hypotheses which were thought to represent the purpose and goals of this study; they are as follows: It was hypothesized that there would be a positive correlation between the Center for Epidemiologic Studies Depression Scale total score (CES-D, a depression symptom inventory) and the Beck Anxiety Inventory total score (BAI, an anxiety

symptom inventory; hypothesis 1), the Davidson Trauma Scale total score (DTS, a PTSD symptom inventory; hypothesis 2), and alcohol and/or drug use (as indicated by collision-concurrent alcohol/drug use or total score on the CAGE, hypothesis 3). Further, it was hypothesized that there would be a positive correlation between a survivor's self-reported history of depression, anxiety, or stress reaction and the symptom inventory total score of the CES-D, BAI, and DTS, respectively (hypothesis 4). Lastly, it was hypothesized that perceived control of the past transportation-related collision event would be positively correlated with the CES-D total score (hypothesis 5) while perceived control of present (hypothesis 6, parts 1 and 2) and future events (hypothesis 7) would be negatively correlated with the CES-D total score.

## CHAPTER 5

### METHOD

#### Participants

One hundred patients (42 women and 58 men) of an Illinois level 1 trauma hospital volunteered to participate. Six patients were under age 18 (either 16- or 17-years-old) and consent for participation was obtained from the patient's parent as well as (assent) from the patient. There was no incentive for participation, but participants were offered a referral to the hospital's psychological services department if desired. All participants were treated in accordance with APA ethical codes (American Psychological Association, 2002).

#### Materials

##### Beck Anxiety Inventory

The Beck Anxiety Inventory (BAI; Beck, Epstein, Brown, & Steer, 1988) is a 21-item self-report scale that measures the severity of anxiety in adults. Each item is rated on a 4-point scale ranging from 0 to 3. The total score is the sum of all symptom items with a maximum score of 63 points. A total score from 0-7 points is thought to indicate minimal anxiety, a score of 8-15 indicates mild anxiety, a score of 16-25 indicates moderate anxiety, and a score of 26-63 indicates severe anxiety. Self-administration reportedly requires 5-10 minutes. The BAI has been used with inpatient medical rehabilitation populations (e.g., Fleming, Strong, & Ashton, 1998).

Beck et al. (1988) reported an internal consistency of .92 in a sample of 160 outpatients, and a test-retest reliability of .75 in a sample of 83 outpatients over a one-week interval. Concurrent validity in the sample of 160 patients was .51 when compared to the *Hamilton*

*Anxiety Rating Scale-Revised* (Hamilton, 1959) as reconstructed by Riskind, Beck, Brown, and Steer (1987). Fydrich, Dowdall, and Chambless (1990) reported that the BAI was significantly correlated with the State ( $r = .47$ ) and Trait ( $r = .58$ ) subscales of *the State-Trait Anxiety Inventory, Form Y* (STAI; Spielberger, 1983) and with the mean 7-day anxiety rating ( $r = .54$ ) of the *Weekly Record of Anxiety and Depression* (WRAD; Barlow & Cerny, 1988).

Some data suggest that when the BAI total scores are compared by gender the scores of women with anxiety disorders may be an average of 4 points higher than those of men with anxiety disorders, especially when the scores are near the upper ends of the ranges. The BAI total score is also inversely related to age; younger patients report more anxiety than do older patients.

## CAGE

The CAGE (Ewing, 1984; Ewing & Rouse, 1970) is a 4-item self-report instrument used in routine screening for alcohol problems. The word CAGE is a composite of the first letters of four key words (cut down, annoyed, guilty, and eye-opener), one word from each of the four questions. Positive responses to questions are summed to arrive at a total score of 0-4. Two or more positive responses are considered clinically significant (Allen & Columbus, 1995).

The sensitivity and specificity of the CAGE varied by population. When used with 154 elderly medical outpatients the sensitivity was 48% and specificity was 99% (Jones, Lindsey, Yount, Soltys, & Farani-Enayat, 1993). In a population of 518 inpatients at a community-based teaching hospital the sensitivity was 85% and specificity was 89% (Bush, Shaw, Cleary, Delbanco, & Aronson, 1987). In a mixed population of 50 healthy non-alcoholic controls, 31 patients with non-alcoholic liver disease, and 40 alcoholic patients the sensitivity was 96% and specificity was 92% (Girela, Villanueva, Hernandez-Cueto, & Luna, 1994).

The prevalence of a positive score on the CAGE is 8.6%. Males, smokers, blue-collar workers, the unemployed, and persons with mild to moderate substance abuse problems are those most readily identified (Lairson et al., 1992). When used as part of a multi-instrument screener, the CAGE has been found to be more effective when not following questions about volume and frequency of alcohol use (Steinweg & Worth, 1993).

#### Center for Epidemiologic Studies Depression Scale

The Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977) is a 20-item self-report scale that measures depressive symptoms. Subjects choose from four possible responses indicating the frequency of the symptom within the “past week.” Each item is scored from 0, “Rarely or none of the time (less than 1 day)” to 3, “Most or all of the time (5-7 days).” To achieve a total, the scores on items 4, 8, 12, and 16 must be reversed so that 0 = 3, 1 = 2, 2 = 1, and 3 = 0, and then all items are summed. Reverse scored items were included to break the tendency towards a response set as well as to assess for positive affect (e.g., “I was happy”) or its absence (e.g., “I felt sad”; Radloff, 1977). Total scores range from 0-60. The significance of scores may be evaluated in one of two ways. Scores of 22 or higher indicate a probable major depression while scores from 15 to 21 indicate a mild to moderate depression (Measurements Excellence Initiative, 2003). Or, in a dichotomous fashion, scores of 16 and above indicate a clinically significant level of depressive symptoms while scores below 16 do not (Radloff, 1977).

The CES-D has been shown to be a reliable and valid measure of depressive symptoms (Radloff, 1977). Test-retest reliability was conducted with varied samples and retest periods from 2 weeks to 12 months. Correlations ranged between .45 and .70 with larger correlations generally

associated with shorter retest times. Internal consistency reliability was found to be .85 in a sample of the general population and .90 in a psychiatric patient sample.

#### Davidson Trauma Scale

The Davidson Trauma Scale (DTS; Davidson, 2003; Davidson, Book, Colket, Tupler, Roth, David, et al., 1997) is a 17-item self-report scale designed to evaluate symptoms of trauma. It may be used for assessment of posttraumatic stress disorder (PTSD) symptom severity, treatment outcome, and screening for a diagnosis of PTSD. Participants rate both the frequency and severity of each trauma symptom on a 5-point (0-4) scale. Total score ranges from 0-136. Each scale item corresponds to one of the 17 *DSM-IV* (1994) PTSD symptoms (but is not the exact symptom) and items are grouped for comparison with *DSM-IV* PTSD diagnostic criteria B (intrusive re-experiencing), C (avoidance and numbness), and D (hyperarousal).

The DTS form incorporates a table of relative frequencies for individuals with and without PTSD that can be used to aid interpretation of the subject's total score. When the frequency of PTSD in the sample population is unknown, a score of 24 is considered the cutoff. When the frequency of PTSD in the sample population is expected to be 10% the cutoff is 48, when the frequency is expected to be 30% the cutoff is 37, and when the frequency of PTSD is expected to be 70% the cutoff is 13. At the cutoff point for each frequency of PTSD there is a 4 to 1 likelihood that an individual has PTSD (Davidson, 2003).

As previously stated, estimates of the rate of PTSD following vehicular collisions have been shown to vary greatly (e.g., 9-100%). For purposes of this study a cutoff score of 37 was used (30% anticipated to have PTSD). This cutoff was estimated to be appropriate after considering that rates of PTSD following airline disasters were 22% (Smith et al., 1990) and

50% (Gregg et al., 1995) and that this study's participants most certainly experienced a traumatic collision severe enough to lead to inpatient hospitalization.

The DTS has been shown to be a reliable and valid measure of PTSD symptoms (Davidson et al., 1997). Test-retest reliability was .86 and internal consistency was .99 in Davidson et al.'s sample of 353 men and women.

### Glasgow Coma Scale

The Glasgow Coma Scale (GCS) is routinely used in the assessment of trauma patients. It assesses the depth and duration of impaired consciousness and coma, as these are expressions of brain dysfunction (Teasdale & Jennett, 1974). The GCS quantifies the degree of consciousness or coma by determining the best motor, verbal, and eye-opening responses to standardized stimuli. Responses are summed to reach a single total score in the range of 3-15. A GCS score of 13 or higher correlates with mild brain injury, scores of 9-12 correlate with moderate injury, and scores of 8 or less correlate with severe brain injury (Trauma.org, 2003). Scores of 3-5 indicate potentially fatal damage (Merck & Co., Inc., 1992). According to Johnston, Findley, DeLuca, & Katz (1991), the GCS is the best single predictor of medical outcome.

### Medical Records

Medical records for the current inpatient stay were reviewed for mention of alcohol or drug use at the time of the collision, GCS scores, and presence of head injury at the time of hospital admission.

## Demographic Questionnaire

A demographic questionnaire was developed specifically for this study (see Appendix A). It asked for information about the participant's gender, age, marital status, ethnicity, language, reading ability, education, work, members in household, income, financial support, details of the collision event, physical disability, injury, pain, stress, history of psychological distress and treatment, alcohol consumption, legal concerns, social support, perceived control, and perspectives on treatment and life change. Questions were designed to be comprehensible to the widest possible range of individuals.

## Design and Procedure

Notices announcing the study, its inclusion criteria, and referral information were posted throughout the hospital (see Appendix B). The hospital trauma team and other medical and allied staff were asked to call this researcher (a clinical health psychology resident at the hospital) when a patient was admitted following a transportation-related collision. Upon patient contact the purpose of the study was explained and a brief and informal assessment was made to determine whether the patient met the study's inclusion criteria. Assessments focused on the patients' cognitive fitness to participate. Patients were required to be alert, oriented, with clear thought processes, and coherent speech. Patients who agreed to participate then signed a voluntary consent form (see Appendix C) and a HIPAA authorization allowing the release current inpatient medical records (see Appendix D). Patients were given a photocopy of the signed consent form and HIPPA authorization to keep.

Once participation status had been established the questionnaire was administered. It was anticipated to take 45-60 minutes to complete, but often took less time. If fatigue became a



problem the questionnaire was completed in one or more sessions. In cases where the patient was unable to complete the questionnaire on their own, this researcher or a family member assisted the patient by reading questions or filling in the patient's responses.

Upon completion of the questionnaire, the patient's current medical chart was accessed to obtain the patient's status as head injured or non-head injured and Glasgow Coma Scale score upon admission, as well as mention of collision concurrent alcohol/drug use. A record of the frequency of patients who declined participation was kept, it included no identifying information.

Confidentiality was a high priority and was maintained through policies of restricted access to participant information including complete separation of identifying information (name) from response information. No other persons had knowledge of the patient's status as a research participant. The consent for participation and the HIPAA authorization for release of medical information were Health Insurance Portability and Accountability Act of 1996 (HIPAA) compliant and included a consent expiration date. Completed participation materials were kept in a locked office at the participating hospital according to HIPAA compliance guidelines.

This study asked patients to recall sensitive and traumatic information. It was recognized that recall of this information could possibly affect the patient's well being and progress in recovery. Therefore, patients were offered a referral for psychological consultation with the hospital's psychological services department regardless of whether the patient chose to participate or not participate or withdrew from the study.

## CHAPTER 6

### RESULTS

#### Overview of the Results

Data analyses included the frequency of response to all questions and summaries of the Center for Epidemiologic Studies Depression Scale (CES-D), Beck Anxiety Inventory (BAI), and Davidson Trauma Scale (DTS) symptom inventory scores. T-tests were conducted to determine if there were significant differences in CES-D, BAI and DTS total scores between the head injured and non-head injured participants. A Pearson's product moment  $r$  correlation was used for all hypotheses testing and for limited exploratory analyses. Two-tailed tests were used unless the direction of relationship was anticipated (e.g., testing of hypotheses). The data were analyzed using SPSS, Version 13.0 (SPSS, Chicago, IL).

A power analysis indicated that a sample size of at least 84 subjects would be necessary to maintain adequate power (.80) to detect a medium effect ( $r = .30$ ) with the significance level (alpha) set a priori at the conventional  $p = .05$ . However, this estimate assumed that all participants would be included in the statistical analyses. Because participants in this study might have been subdivided into smaller groups for statistical analyses (e.g., head injured vs. non-head injured), it was estimated that having 100 subjects would provide some protection against a loss of power.

#### Descriptive Statistics

One hundred patients participated in this study, 42 women and 58 men ( $M = 38.8$  years,  $SD = 17.18$ ). Unless otherwise noted all response frequencies (e.g., percent of sample) will be

reported in number of participants which, in this study, also equals percent of participants (e.g., 42 women = 42%, 58 men = 58%). Continuous statistics of the sample are listed in Table 1.

Table 1

*Sample Continuous Statistics: Number of Responses, Means, Standard Deviations, and Ranges*

Measure	n	M	SD	Range
Subject age	100	38.8	17.18	16-88
Number of people in family household	99	3.03	1.57	1-10
Time unconscious (in minutes)	51	201	523	1-2880
Number of collisions in lifetime	100	1.58	1.89	0-12
Number of collisions in the last year	100	.17	.45	0-2
Number of collision injuries in lifetime	100	.57	.99	0-6
Number of collision injuries in the last year	100	.07	.29	0-2
Number of acute distress symptoms	100	1.61	1.52	0-5 /5
Level of pain on average since the collision	100	7.31	1.86	0-9 /9
Number of extreme fears reported	51	1.63	.85	1-4
Number of extremely stressful events... ...in the 12 months before the collision	39	1.36	.81	1-5
Number of extremely stressful events... ...prior to 12 months before the collision	38	1.92	1.32	1-5
CAGE total score	99	.71	1.32	0-4 /4
Number of alcoholic drinks per week	99	3.87	10.25	0-70
Center for Epidemiologic Studies... ...Depression Scale (CES-D) total score	100	17.83	12.49	0-54 /60
Beck Anxiety Inventory (BAI) total score	99	16.83	11.40	0-48 /63
Davidson Trauma Scale (DTS) total score	100	26.81	23.22	0-108 /136

Twenty-five patients declined participation and another 50-70 agreed, but did not complete the questionnaire. Two patients were missing responses on the DTS and one did not complete the BAI, although, in all cases the patient's remaining responses were included in the data analyses.

The percentages of collisions of the sample, grouped by patient age, are shown along with national fatality statistics in Table 2 (there were no comparable participants of age 15 and

under in this sample). The percentages of collisions in each age group were as follows: 27 were in the 16-24 age group, 56 were in the 25-54 age group, and 17 were in the 55 or older age group. Compared to national statistics there were somewhat more participants in the 25-54 age group and somewhat less participants in the 55 and older age group.

Table 2

*Percentage of Collisions by Age Group Compared to National Collision Fatality Statistics*

Age Group	% of Collisions in Sample	% Fatal Collisions in Nation*
15 and Under	N/A (no subjects this age)	5
16 - 24	27	24
25-54	56	46
55 and Older	17	25

\*2005 National Highway Traffic Safety Administration (NHTSA, 2006)

The patients' racial/ethnic backgrounds are shown in Table 3 along with state and national statistics. Racial/ethnic backgrounds were: 56 Caucasian (not Hispanic), 30 African American (Black), 11 Hispanic/Latino, 2 Native American, and 1 reported as other.

Table 3

*Racial/Ethnic Background Compared to Illinois and National Statistics*

Race/Ethnicity	% in Sample	% in Illinois*	% in Nation*
Caucasian	56	66	67
African American	30	15	13
Hispanic, Latino	11	14	14
Asian American	0	4	4
Native American	2	0.3	1
Other	1	1	2

\*2005 US Census Bureau, State and County Quick Facts (n.d.)

The number of people in the patient's household ranged from one to ten ( $n = 99$ ,  $M = 3.03$ ,  $SD = 1.57$ ). Forty-seven patients were single, 27 married, 9 living with a significant other, 9 divorced, 7 widowed, and 1 separated. English was the primary language for 95 patients, 4 spoke Spanish, and 1 another language.

The educational attainments of the sample along with those of the nation are shown in Table 4. Twenty-two did not finish high school, 45 finished high school or attained a G.E.D., 10 graduated from a technical school or equivalent, 15 graduated from college, and 8 graduated with a higher degree (e.g., Masters). All patients reported that they read English well ( $n = 8$ ) or very well ( $n = 92$ ).

Table 4

*Educational Attainment Compared to National Statistics*

Level of Education	% in Sample	% in Nation*
Did not finish high school	22	20
Finished high school or GED	45	50
Graduated technical school	10	8**
Graduated college	15	15
Graduated higher degree	8	7

\*US Census Bureau, Educational Attainment: 2000 (2003), rounded to whole numbers

\*\*Category is Professional degree and Associates degree combined

Sixty-four patients were working within the month before the collision and 36 were not. Of the 64 who worked, 49 (76.6%) worked full time and 15 (23.4%) worked part time; 60 (95.2%) liked their job while 3 (4.8%) did not, and 1 did not respond. For 36 (56.3%) of the 64 patients who worked, their income was the household's primary income, for 17 (26.6%) it was secondary, and for 11 (17.2%) it did not contribute to the household's income.

Household incomes of the sample ( $n = 99$ ) and those of the state of Illinois are shown in Table 5. Income of the sample ranged from less than \$10,000.00 to more than \$200,000.00 with the two primary modes of response being the \$10,000-25,000.00 range and the \$80,000-120,000.00 range (note: the income ranges for the sample's eight response choices were not equal and are not directly comparable to the income ranges of the state of Illinois).

Table 5

*Household Income Compared to Illinois Statistics*

Income Range in \$*	% in Sample**	Income Range in \$	% in Illinois***
Less than 10,000	10	Less than 10,000	8.3
10,001-25,000	22	10,000-24,999	16.8
25,001-40,000	12	25,000-34,999	11.9
40,001-60,000	15	35,000-49,000	16.2
60,001-80,000	9	50,000-74,999	20.7
80,001-120,000	22	75,000-99,999	11.6
120,001-200,000	8	100,000-149,999	9.0
200,000 or more	1	150,000-199,999	2.6
		200,000 or more	2.8

\*Income ranges are not equivalent; \*\* $n = 99$ ; \*\*\*US Census Bureau, Illinois Profile of Selected Economic Characteristics: 2000 (n.d.)

Fifty-seven patients (57.6%) reported that the collision would cause their personal income to decrease, 42 (42.4%) said it would not, and 1 did not respond. Forty-one patients supported dependents (e.g. children, spouse, or elderly relative) and 59 did not.

Ninety patients were driving, riding in, or riding on a vehicle when the collision occurred and 10 were pedestrians (see Table 6). The majority of non-pedestrians were driving or riding in a car, truck, or van, although 7 were on a motorcycle; 2 were on an ATV; 2 were on a bicycle; 1 each on a bus, tow truck, train, and watercraft; and 3 were horse-related. Sixteen patients (21.3%) reported that their vehicle rolled over during the collision, 59 (78.7%) had no rollover,

the question was not applicable (N/A) for 24, and 1 patient did not respond. Thirty-two patients (32.3%) were trapped or pinned in the wreckage of the collision, 67 (67.7%) were not, and 1 patient did not respond. Of the 32 who were trapped or pinned, extrication took 10 minutes or less for 10 patients (31.3%), it took 11-45 minutes for 15 patients (46.9%), and for the remaining 7 patients (21.9%) extrication took more than 45 minutes. Equipment was used to remove 27 patients (36.5%) from their vehicle, for 47 (63.5%) it was not used, the question was not applicable for 25, and 1 patient did not respond. Twenty patients reported having had an “injury this severe or more severe” in the past.

Table 6

*Type of Transportation Compared to National Motor Vehicle Injury and Fatality Statistics*

Type of Transportation	% In Sample	% National Motor Vehicle Injuries*	% National Motor Vehicle Fatalities*
Car, truck, or van**	73	92	74
Bus	1	1	1
Motorcycle (ATV***)	9	3	10
Bicycle (Pedal-cyclists)	2	2	2
Pedestrian	10	2	11
Train or Subway	1	Not included	Not included
Watercraft	1	Not included	Not included
Horse	3	Not included	Not included
Other/Unknown	Not included	1	2

\*National Highway Traffic Safety Administration (NHTSA, 2006), Traffic Safety Facts 2005;

\*\*Includes tow truck; \*\*\*Includes ATV in sample, unclear where ATV is in national data

Of the 70 patients who were in vehicles typically equipped with seatbelts, 55 (78.6%) were belted and 15 (21.4%) were not (see Table 7). Two of the 15 patients who were not belted reported that there were no seatbelts in their vehicle. Thirteen patients reported that a helmet

should have been used with their mode of transportation (all of those on motorcycle, bicycle and ATV responded and two of the five patients in horse-related incidents responded). Of the 13, 5 (38.5%) wore a helmet and 8 (61.5%) did not (see Table 7). The one patient who was involved in a watercraft collision was not wearing a life vest.

Table 7

*Seatbelt and Helmet Usage Compared to National Statistics*

Safety Device	% in Sample	% in Nation*
Seatbelt Use	79 ( $n = 70$ )	82
Helmet Use	39 ( $n = 13$ )	48

\*National Highway Traffic Safety Administration (NHTSA, 2006), Traffic Safety Facts 2005

Forty-eight patients reported that someone known (e.g., family, friend, coworker) was with them during the collision. For 23 (47.9%) of the 48, the known person was seriously injured and for 1 (2.1%) of the 48, a known person died. Fifty-three patients reported that someone unknown (e.g., a stranger) was involved in the collision. For 14 (26.9%) of the 53, the unknown person was seriously injured and for 3 (5.6%) of the 53, an unknown person died.

When asked to rate the severity of the injuries sustained in the collision, 2 patients reported “unremarkable,” 8 reported “mild,” 24 reported “moderate,” 44 reported “severe,” and 22 reported their injuries as “extreme/life threatening.” Fifty-six patients (56.6%) lost consciousness at some time during or after the collision. Total time unconscious, which was reported by 51 and not reported by 5, ranged from 1-2,880 minutes ( $M = 201$  min.,  $SD = 523$  min.,  $C_{25} = 15$  min.,  $C_{50} = 30$  min.,  $C_{75} = 90$  min.). Three patients were burned in the collision and 40 had thoughts, either during or after the collision that they might die.



The total number of lifetime collisions ranged from 0-12 ( $M = 1.58$ ,  $SD = 1.89$ ) with most patients (79%) reporting 0, 1, or 2 collisions. Within the last year 11 patients were in 1 collision, 3 patients were in 2 collisions ( $M = .17$ ,  $SD = .45$ ), and 86 patients were not in a collision. The total number of lifetime collisions in which injuries were sustained ranged from 0-6 ( $M = .57$ ,  $SD = .99$ ) with most reporting 0 or 1 collision with injuries. Within the last year, 5 patients were injured in 1 collision, 1 patient was injured in 2 collisions ( $M = .07$ ,  $SD = .29$ ), and 94 patients were not injured in a collision.

Five questions corresponding to criterion B, (dissociative symptoms) in the *DSM-IV*'s (1994) acute stress disorder (ASD) diagnosis were included in the questionnaire. Questions included: "During the collision or at any time since the collision have you experienced any of the following:" "A sense of emotional numbing, emotional detachment, or absence of emotional responsiveness?" (yes = 33, no = 67); "A reduction in awareness of your surroundings (e.g., 'being in a daze')?" (yes = 45, no = 55); "Derealization - A feeling that things around you are not real?" (yes = 29, no = 71); "Depersonalization - A feeling that you are not real or are detached from the environment?" (yes = 19, no = 81); and "Amnesia - An inability to recall an important aspect of the trauma?" (yes = 36, no = 64). When totaled, 31 patients had no ASD symptoms, 24 had one, 17 had two, 14 had three, 9 had four, and 5 had five ( $M = 1.61$ ,  $SD = 1.52$ ) and 28 patients had the three or more symptoms necessary to meet criterion B (dissociative symptoms) in the diagnosis of ASD.

Perception of control of past, present, and future collision-related events are grouped by self, others, and God/Higher Power in Figures 1, 2, and 3 respectively. Most patients reported little or no control of (past) "events that caused the collision" (no control = 54, little control = 17, some control = 13, much control = 7, total control = 9). They reported more control of their

(present) “recovery process right now” and “life in general right now” (“recovery process:” no control = 9, little control = 16, some control = 21, much control = 26, total control = 28; “life in general:” no control = 8, little control = 11, some control = 19, much control = 30, total control = 32) and mixed control of their (future) ability to “prevent a collision...from happening...again” (no control = 20, little control = 12, some control = 20, much control = 15, total control = 33).

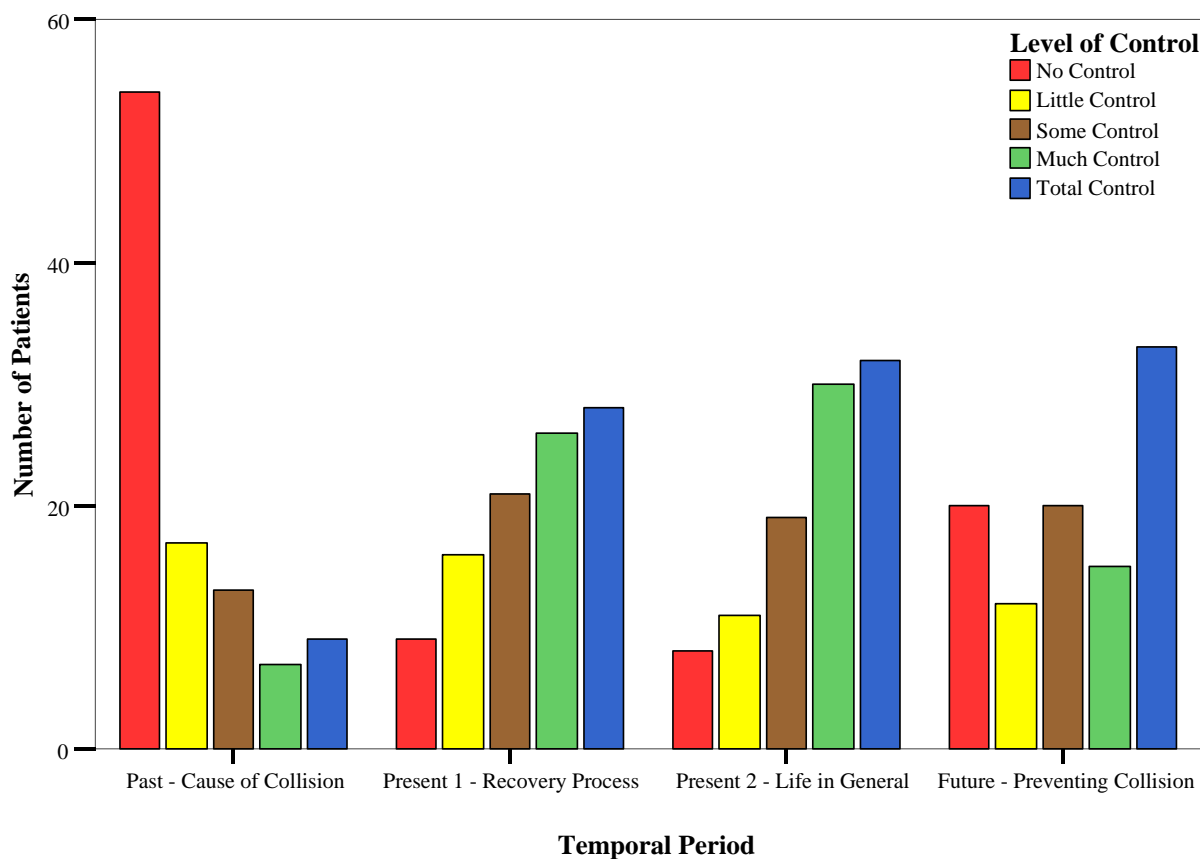


Figure 1. Perception of self-control of temporal collision-related events.

The patients’ perception of control by others of past, present, and future collision-related events is shown in Figure 2. Perception of others’ control of the (past) “events that caused the collision” and (present) “recovery process right now” was mixed (collision: no control = 35, little control = 10, some control = 21, much control = 8, total control = 26; recovery process: no

control = 13, little control = 20, some control = 29, much control = 28, total control = 10).

Others' control of (present) "life in general right now" tended to be low (no control = 25, little control = 23, some control = 30, much control = 14, total control = 8). Others' control of (future) "preventing a collision like this from happening...again" was also mixed (no control = 27, little control = 15, some control = 25, much control = 11, total control = 22).

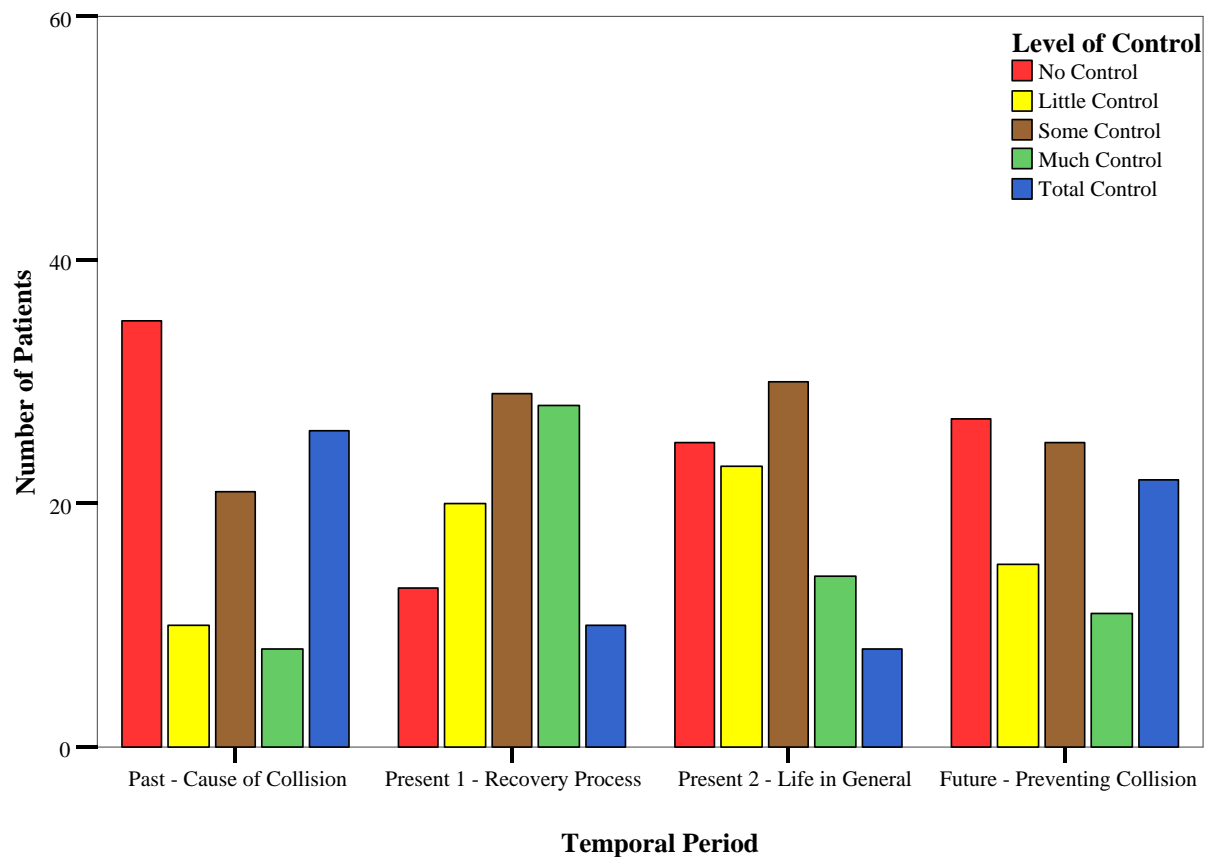


Figure 2. Perception of others' control of temporal collision-related events.

Ninety-five patients reported believing in God/Higher Power. The patients' perception of control by God/Higher Power of past, present and future collision-related events is shown in Figure 3. Of the 95 reporting belief, perception of control by God/Higher Power was high for past, present, and future situations ("events that caused the collision": no control = 19, little

control = 4, some control = 16, much control = 14, total control = 42; “recovery process right now”: no control = 11, little control = 3, some control = 14, much control = 20, total control = 47; “life in general right now”: no control = 10, little control = 3, some control = 15, much control = 18, total control = 49; “preventing a collision like this from happening...again”: no control = 17, little control = 5, some control = 18, much control = 19, total control = 36).

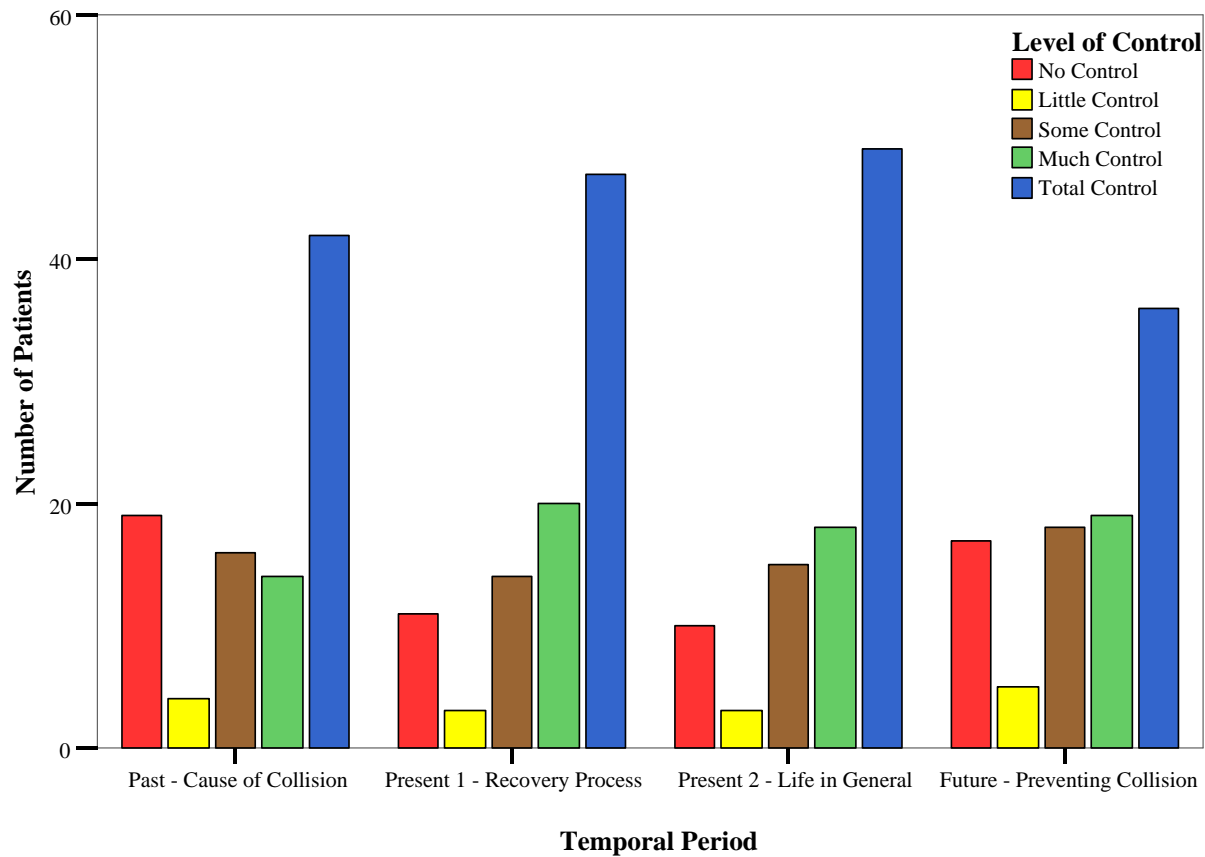
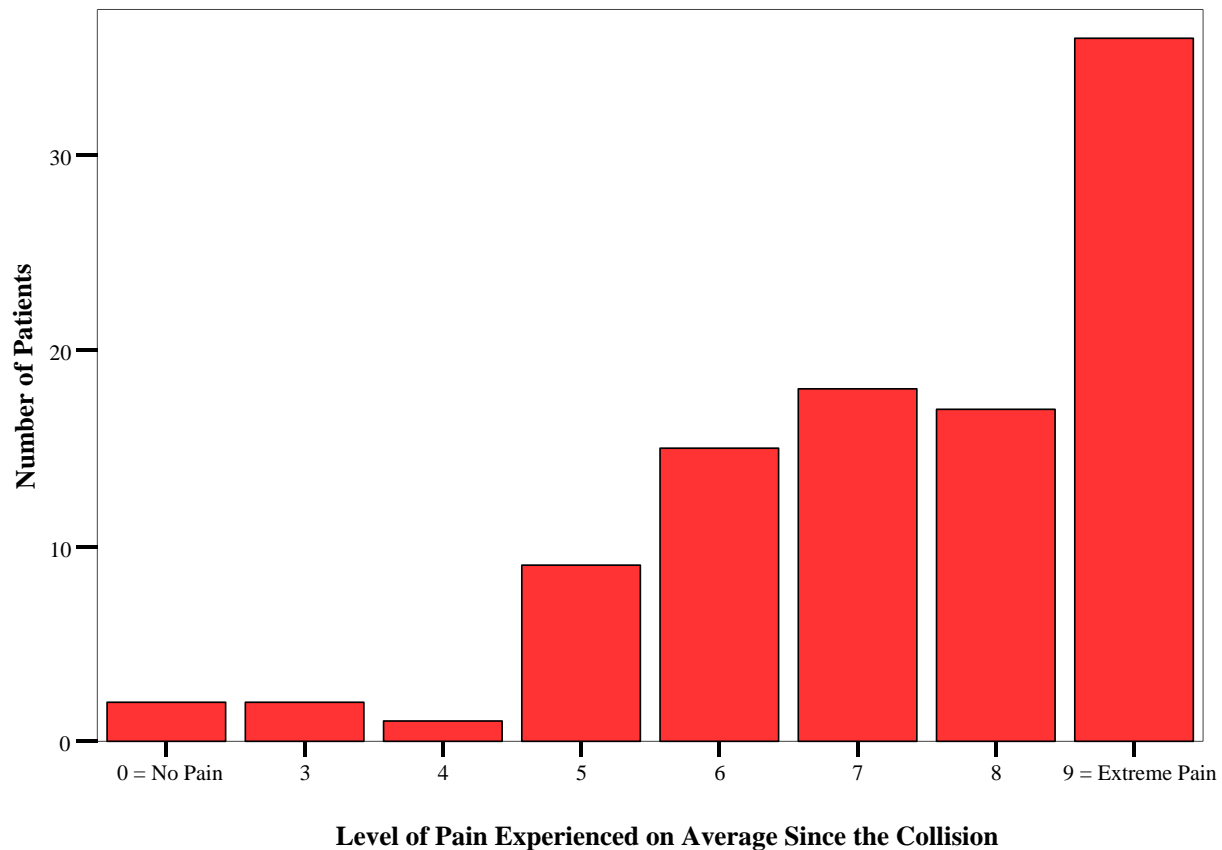


Figure 3. Perception of God/Higher Power’s control of temporal collision-related events.

Patients were asked to report the likelihood of “an event this bad or worse happening to you [them] again.” Ninety-nine patients responded; 49 (49.5%) reported that it is very unlikely or unlikely, 46 (46.5%) reported that it’s possible, and 4 (4%) reported that it is likely or very likely.

Most patients reported their level of pain on average since the collision as very high: 14 patients reported a level of 0-5, 50 reported a level of 6-8, and 36 reported a level of 9 ( $M = 7.31$ ,  $SD = 1.86$ , see Figure 4).



**Level of Pain Experienced on Average Since the Collision**  
*Figure 4.* Level of pain experienced on average since the collision.

Patients were asked about their history of and treatment for serious depression, serious prolonged anxiety, and reaction to stress. Also, whether they were experiencing depression or anxiety at the time of the collision and whether they felt guilty about the collision. Forty-nine patients reported that they had been seriously depressed at some time in their life and 23 had been treated by a doctor for serious depression. Thirty reported having had serious prolonged anxiety at some time in their life and 15 had been treated by a doctor for serious prolonged

anxiety. Further, 13 patients reported having serious depression and 6 reported having serious prolonged anxiety at the time of the collision. Nine patients had been told by a doctor at some time in the past that they “may have had a serious reaction to stress” and 40 patients reported feeling guilty about the collision.

Patients were asked, “Is there anything that you are extremely afraid of (e.g., afraid of heights)?” [Yes or No] “If yes, briefly list here:” Fifty-two patients acknowledged having at least one extreme fear. Fifty-one provided a description of their fear (see Table 8); 29 (56.9%) reported one fear, 14 (27.5%) reported two fears, 6 (11.8%) reported three fears, and 2 (3.9%) reported four fears ( $M = 1.63$ ,  $SD = .85$ ). Fear of heights, spiders, closed spaces (claustrophobia), and fear of death/dying were the most frequently reported fears. It is not surprising that a fear of heights was one of the most frequently reported fears as it was used as an example in the question and certainly required the least effort to recall.

Patients were asked “Within the 12 months before the collision, were there events that were extremely stressful for you?” [Yes or No] “If yes, please very briefly describe the nature of the stressful event(s).” Forty patients reported having had stressful events in the 12 months before the collision. Thirty-nine provided a description of the stressful event(s) (see Table 9); 30 (76.9%) reported one stressful event, 6 (15.4%) reported two stressful events, 2 (5.1%) reported three stressful events, and 1 (2.6%) reported five stressful events ( $M = 1.36$ ,  $SD = .81$ ).

Table 8

*Extreme Fears, Description and Frequency*

Extreme Fear	Number of Patients
Heights	21
Spiders	9
Claustrophobia/closed spaces	8
Death/dying	6
Snakes	3
Bees/wasps	2
Being alone	2
Dogs	2
Drowning	2
Hospitals	2
Needles	2
Sharks	2
Accidents	1
Animals on the road	1
Being hurt by someone at night	1
Being trapped under ice	1
Being unemployed for a long time	1
Bridges	1
Bugs	1
Car accidents	1
Chicago Police	1
Deep water	1
Depths	1
Family or friends being killed	1
Finances	1
God	1
Losing a finger, limb, eye, etc.	1
Loss of control	1
Meteors falling and killing	1
Planes	1
Rats	1
Snails	1
Suffocation	1
Tornados	1

Table 9

*Stressful Events in the 12 Months before the Collision, Description and Frequency*

Stressful Event	Number of Patients
Death of a family member	12
Financial crisis	8
End of relationship, not marriage	3
Fired from job/loss of job	2
Serious personal injury/illness	2
Being put in jail	1
Change of occupation	1
Family problems	1
Filing for bankruptcy	1
Going through a divorce	1
Having a baby	1
Hurricane	1
Illness of family member	1
Loss of home to foreclosure	1
Personal substance abuse	1
Problems at work	1

Patients were again asked about extremely stressful events but in a more remote time frame: “Prior to 12 months before the collision, were there events that were extremely stressful for you?” [Yes or No] “If yes, please very briefly describe the nature of the stressful event(s).” Thirty-eight patients reported having had one or more remote stressful events and provided a description of the stressful event(s) (see Table 10); 23 (60.5%) reported one stressful event, 4 (10.5%) reported two stressful events, 4 (10.5%) reported three stressful events, 5 (13.2%) reported four stressful events, and 2 (5.3%) reported five stressful events ( $M = 1.92$ ,  $SD = 1.32$ ).



Table 10

*Stressful Events Prior to 12 Months before the Collision, Description and Frequency*

Stressful Event	Number of Patients
Death of a family member	5
Serious personal illness/injury	4
Financial crisis	3
Alcoholic family member	2
Death of a friend	2
Military service/fought in war	2
Being put in jail	1
Being sexually abused	1
Car accident	1
Change of occupation	1
Changing family relationships	1
Depressed family member	1
End of relationship	1
Family member who was shot	1
Going through a divorce	1
Having an abortion	1
Having kids while in high school	1
Illness of family member	1
Pain in personal life	1
Personal substance abuse	1

Patients were asked about the impact that the collision had on their lives: “Has this event changed your life for the better or worse, or not changed your life at all?” Ninety-nine patients responded; 50 (50.5%) reported that their life had changed for the better, 28 (28.3%) reported that it had not changed at all, and 21 (21.2%) reported that their life had changed for the worse.

When patients were asked whether they thought they would be “at least partially disabled by this injury in 3 months,” 48 (48.5%) said yes and 51 (51.5%) said no. When asked about similar disability in 12 months, 19 (19.2%) said yes and 80 (80.8%) said no ( $n = 99$ , 1 patient’s response were excluded because the patient reported not being disabled in 3 months, but being disabled in 12 months - one of the two questions was mismarked). When patients were asked,

“Do you think you will ever be the same again?” 56 thought they would and 44 thought they would not. Twenty-one patients were “limited by a physical disability” prior to the collision.

Ninety-six patients were satisfied with the care they received from their current doctor and 91 were satisfied with the care they received from the hospital staff, not including their current doctor. Concern about hospital and doctor bills varied (no concern = 34, little concern = 18, some concern = 21, much concern = 12, and total concern = 15).

Twenty-three patients (23.2%) reported being found legally liable or issued a ticket for the collision, 76 (76.8%) were not ( $n = 99$ ). Fifty-five patients either had talked to an attorney or intended to talk to an attorney about compensation for injuries sustained in the collision.

Responses ( $n = 99$ ) to the four CAGE questions were as follows: “Have you ever felt you should cut down on your drinking or drug use?” 21 (21.2%) said yes and 78 (78.8%) said no, “Have people annoyed you by criticizing your drinking or drug use?” 15 (15.2%) said yes and 84 (84.8%) said no, “Have you ever felt bad or guilty about your drinking or drug use?” 19 (19.2%) said yes and 80 (80.8%) said no, and “Have you ever had a drink or drug first thing in the morning (an eye opener) to steady your nerves or get rid of a hangover?” 15 (15.2%) said yes and 84 (84.8%) said no. Two or more “Yes” responses are considered clinically significant and when summed 71 patients (71.7%) had zero yes responses, 10 (10.1%) had one, 3 (3.0%) had two, 6 (6.1%) had three, and 9 patient (9.1%) had four yes responses ( $M = .71$ ,  $SD = 1.32$ ).

Patients were also asked approximately how many alcoholic drinks they consumed per week; 56 reported zero and 43 ( $n = 99$ ) reported consumption in the range of 1-70 ( $M = 3.87$ ,  $SD = 10.25$ ). Of the 16 heaviest drinkers, 6 reported having 6-9 drinks per week, 5 reported having 10-15 drinks per week, and the remaining 5 reported having 23 or more drinks per week.

Ninety-one patients (91.9%) said they have had a family member or friend checking on them regularly since the collision and 8 (8.1%) did not ( $n = 99$ ). When asked, “How much social and emotional support do you feel you have right now?” 1 (1.0%) reported no support, 4 (4.0%) reported little support, 11 (11.1%) reported some support, 35 (35.4%) reported much support, and 48 (48.5%) reported total support ( $n = 99$ ). Seventy patients (70.7%) reported that the collision brought them closer to their family or friends while 29 (29.3%) felt it had not ( $n = 99$ ). Of the 95 who reported believing in God/Higher Power, 64 (67.4%) said the collision brought them closer to God/Higher Power while 31 (32.6%) said it had not. Seventeen patients said that they were able to do something they “enjoy right now (e.g., leisure or recreational activities, hobbies, games, etc.)” while the remaining 83 said they were not. Thirty-seven patients responded to the question “Would you like to be referred to the psychological services department?” and two requested a referral.

There were several entries within the “...for researcher use only” box at the end of the questionnaire (e.g., contact date, contacted by, name of hospital, Glasgow Coma Scale (GCS) score, and mention of head injury or alcohol/drug use). The date of contact was not completed, as it was not of importance. The “contacted by” and “name of hospital” entries were completed but all entries were the same (these two entries may have been of value had this been a multi-site study with multiple researchers as had once been considered).

Seventy-three patients (76.8%) had a GCS score of 15, 12 (12.6%) had a GCS of 14, 3 (3.2%) had a GCS of 13, 2 (2.0%) had a GCS of 12, another 2 (2.0%) had a GCS of 11, and 3 (3.2%) had a GCS of 6; 5 more patients did not have a GCS score recorded in their chart. GCS scores were not used in further analyses. Twenty-five patients (25.3%) were reported to have

sustained a head or brain injury, for 74 (74.7%) others there was either a report of no head injury or no report at all, and 1 patient was missing this response.

Twenty-seven patients had mention of collision concurrent alcohol use in their medical chart and 13 had similar mention of drug use. Some patients had notation of both alcohol and drug use and were included in both the alcohol and drug use groups.

A subjective assessment of the general level of assistance required by the patient to complete the questionnaire was made; 48 required no assistance, 33 required moderate assistance (e.g., some assistance reading or answering questions), and 19 required a high level of assistance (e.g., assistance with all or most questions). Assistance may have been necessary for many reasons including visual impairment, lack of corrective eyewear, poor comprehension of a question, and an inability to write due to injury.

#### CES-D, BAI, and DTS Symptom Inventory Scores

Total scores on the CES-D ranged from 0-54 ( $M = 17.83$ ,  $SD = 12.49$ , see Figure 5). Forty-five patients had a score of 0-14 indicating no to minimal depression, 29 had a score of 15-21 indicating mild to moderate depression, and 26 (15 females and 11 males) had a score of 22-60 indicating likely major depression.

Table 11 lists the self-reported history of serious depression, self-reported depression at the time of the collision, high scores on the CES-D (scores of 22-60), and possible explanations for the current state of depression. Forty-five patients had never had a serious depression, 6 had a new onset of depression, 7 had a continuation, 13 had a relapse, 23 had a remote history with no relapse, and 6 had remote and collision concurrent depression, but not a high CES-D total score which possibly indicates improvement in mood.

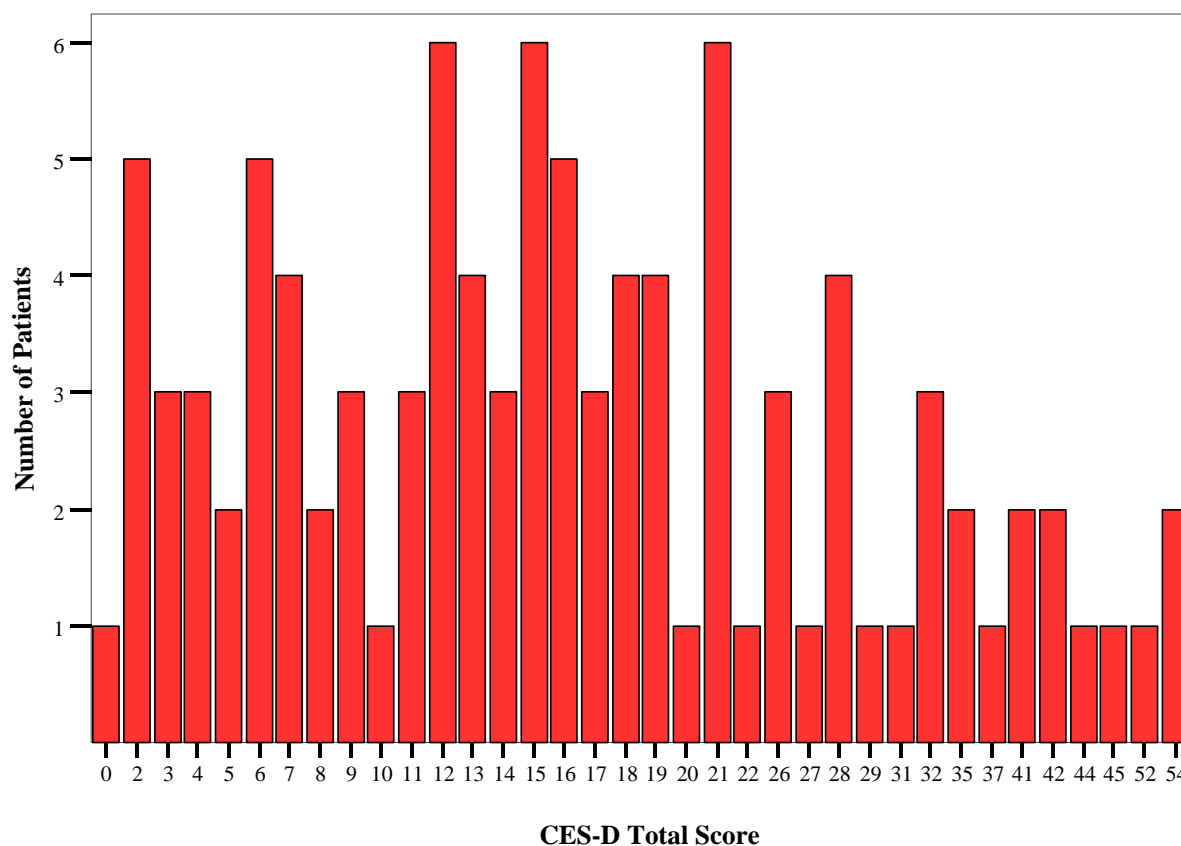


Figure 5. Center for Epidemiologic Studies Depression Scale (CES-D) total score distribution.

Table 11

*Number of Patients and Possible Distress Condition by History of Serious Depression, Depression at Time of Collision, and High Depression Inventory (CES-D) Score*

History of Depression	Depression at time of Collision	High Depression Inventory Score*	Number of Patients	Possible State of Depression
No	No	No	45	Never depressed
No	Yes	No	0	Response mismarked?
No	No	Yes	6	New onset depression
No	Yes	Yes	0	Response mismarked?
Yes	No	Yes	13	Relapse
Yes	Yes	Yes	7	Continuation
Yes	No	No	23	History, but no relapse
Yes	Yes	No	6	Improved?

\*Center for Epidemiologic Studies Depression Scale (CES-D) score of 22-60

Total scores on the BAI ranged from 0-48 ( $n = 99$ ,  $M = 16.83$ ,  $SD = 11.40$ , see Figure 6). Twenty-three patients had a score of 0-7 indicating no to minimal anxiety, 26 had a score of 8-15 indicating mild anxiety, 30 had a score of 16-25 indicating moderate anxiety, and 20 (14 females and 6 males) had a score of 26-48 indicating severe anxiety.

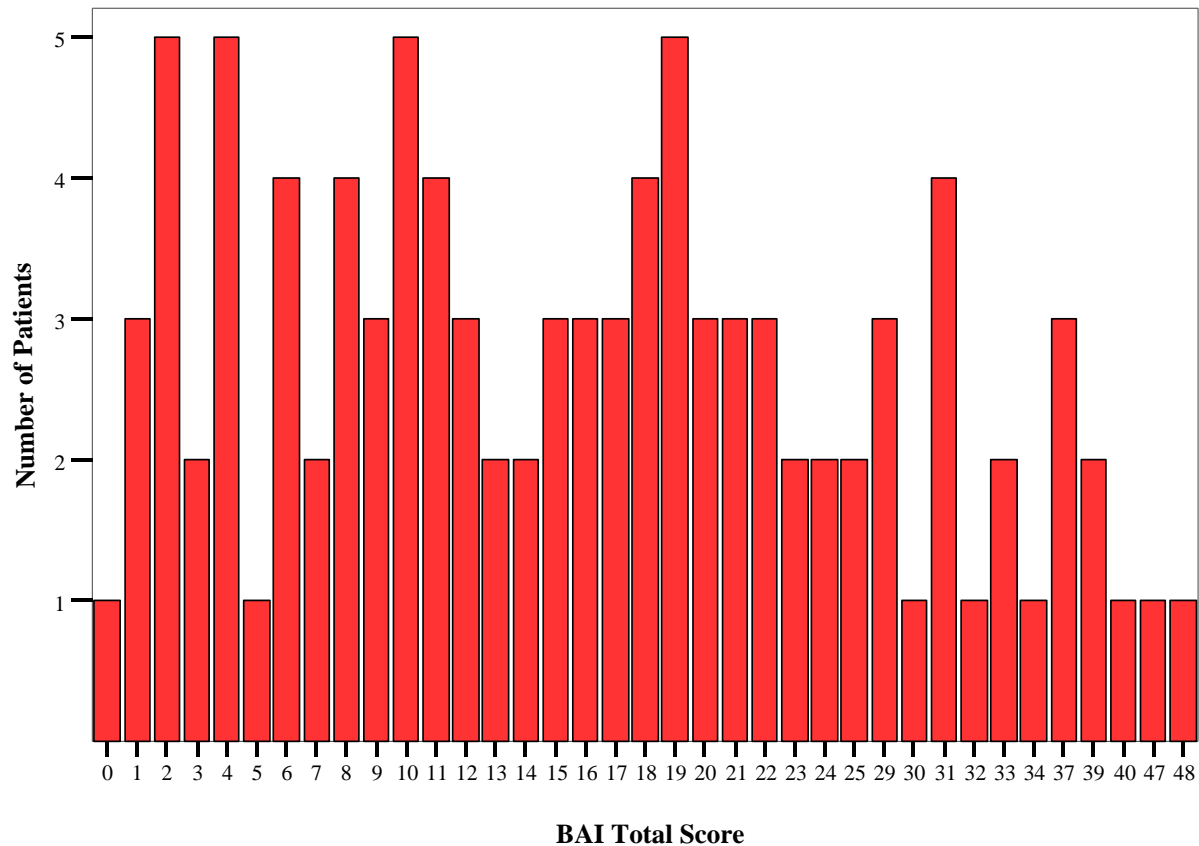


Figure 6. Beck Anxiety Inventory (BAI) total score distribution.

Similar to results of other studies, the BAI total scores of females ( $n = 41$ , one female missing BAI score) were higher than those of males ( $n = 58$ ; mean difference 5.83,  $t = -2.58$ ,  $df = 97$ ,  $p = .01$ ) and BAI total scores were higher for younger patients (ages 16-37,  $n = 48$ ) as compared to older patients (ages 38-88,  $n = 51$ ; mean difference 5.78,  $t = -2.59$ ,  $df = 97$ ,  $p = .01$ ).

Table 12 lists the self-reported history of serious prolonged anxiety, self-reported anxiety at the time of the collision, high scores on the BAI (scores of 26-63), and possible explanations

for the current state of anxiety. Fifty-nine patients had never had serious prolonged anxiety, 10 had a new onset of anxiety, 5 had a continuation, 5 had a relapse, 19 had a remote history with no relapse, and 1 had remote and collision concurrent anxiety, but not a high BAI total score which possibly indicates improvement.

Table 12

*Number of Patients and Possible Distress Condition by History of Serious Prolonged Anxiety, Anxiety at Time of Collision, and High Anxiety Inventory (BAI) Score*

History of Anxiety	Anxiety at time of Collision	High Anxiety Inventory Score*	Number of Patients**	Possible State of Anxiety
No	No	No	59	Never anxious
No	Yes	No	0	Response mismarked?
No	No	Yes	10	New onset anxiety
No	Yes	Yes	0	Response mismarked?
Yes	No	Yes	5	Relapse
Yes	Yes	Yes	5	Continuation
Yes	No	No	19	History, but no relapse
Yes	Yes	No	1	Improved?

\*Beck Anxiety Inventory (BAI) score of 26-63; \*\* $n = 99$

Total scores on the DTS ranged from 0-108 ( $M = 26.81$ ,  $SD = 23.22$ , see Figure 7).

Seventy-three patients had a score in the range of 0-36 indicating no or sub-threshold posttraumatic stress symptoms (PTSD) while 27 had a score of 37-136 indicating a clinically significant level of trauma symptoms.

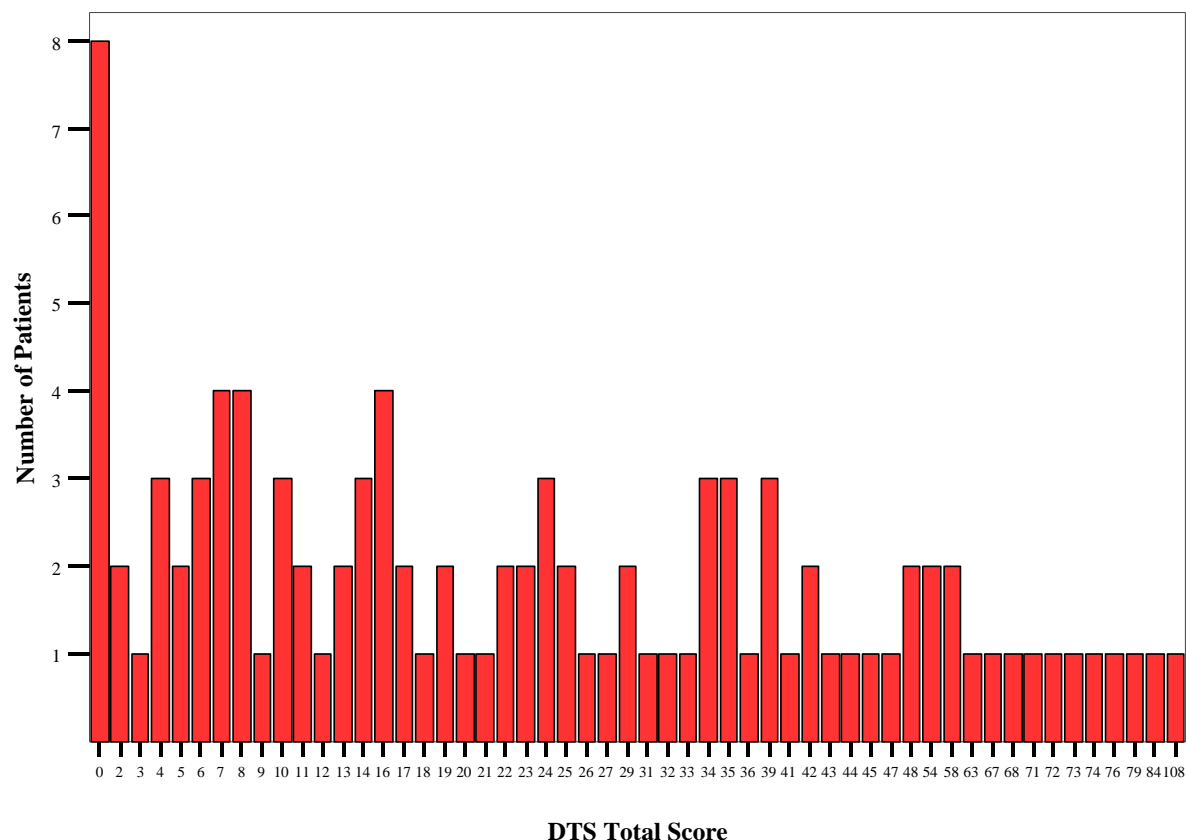


Figure 7. Davidson Trauma Scale (DTS) total score distribution.

Each of the 17 questions on the DTS *corresponds* (not the exact question) to one of the 17 *DSM-IV* (1994) posttraumatic stress disorder (PTSD) diagnostic criteria and the items are arranged in a similar order. When DTS scores were grouped and compared to the *DSM-IV* (1994) PTSD diagnostic criteria, 66 patients met criterion B (intrusive re-experiencing), 32 met criterion C (avoidance and numbness), 58 met criterion D (hyperarousal), and 23 patients met all three criteria (B, C, and D). Of the 23 who met all three, 19 also had a DTS total score of 37 or higher indicating a clinically significant level of trauma symptoms.

A diagnosis of PTSD cannot be made during the first month post trauma; however, during that time a diagnosis of acute stress disorder (ASD) may be warranted. For a diagnosis of ASD the patient must have had three or more dissociative symptoms (criterion B) and at least



one symptom of intrusive re-experiencing (criterion C), avoidance (criterion D), and hyperarousal (criterion E). Note that ASD's diagnostic criteria C, D, and E are similar to those of the PTSD diagnostic criteria B, C, and D, respectively.

Twenty-two patients met the ASD diagnostic criteria, although the five dissociative questions and all DTS questions only *correspond* to the *DSM-IV* (1994) ASD diagnostic criteria. Further, 12 patients had three or more dissociative symptoms and met the PTSD criteria B, C, and D (intrusive re-experiencing, avoidance and numbness, and hyperarousal, respectively) and 13 patients had three or more dissociative symptoms and a DTS score of 37 or higher indicating a clinically significant level of trauma symptoms.

## Statistical Examination

### Preliminary Analyses

There were no significant differences between the scores of head injured and non-head injured patients on the CES-D ( $t[97] = 1.85, p = .07$ ), BAI ( $t[96] = .08, p = .94$ ), or DTS ( $t[97] = 1.25, p = .22$ ). Therefore, the data for the two groups remained pooled for subsequent analyses.

### Hypothesis Testing

The CES-D total score was significantly correlated with the following: the BAI total score (hypothesis 1,  $n = 99, r = .59, p < .001$ ), the DTS total score (hypothesis 2,  $r = .63, p < .001$ ), and mention of alcohol and/or drug use at the time of the collision (hypothesis 3,  $r = .24, p = .02$ ). BAI and DTS total scores were also significantly correlated ( $n = 99, r = .61, p < .001$ ).

There were significant correlations between the CES-D total score and responses to the following three questions regarding history of depression (hypothesis 4): "Have you been

seriously depressed at some time in your life?” ( $r = .43, p < .001$ ), “Has a doctor ever treated you for depression?” ( $r = .46, p < .001$ ), and “Did you have serious depression at the time of the collision?” ( $r = .33, p < .001$ ). Not surprisingly, responses to the three questions regarding history of depression were also significantly correlated with one another: “depressed at some time in...life” by “treated...for depression” ( $r = .46, p < .001$ ), “depressed at some time in...life” by “depressed at...collision” ( $r = .39, p < .001$ ), and “treated...for depression” by “depressed at...collision” ( $r = .28, p = .002$ ).

There were similar significant correlations between the BAI total score and responses to the following the three questions regarding history of anxiety (hypothesis 4 continued): “Have you had serious prolonged anxiety at some time in your life?” ( $n = 99, r = .28, p = .003$ ), “Has a doctor ever treated you for serious prolonged anxiety?” ( $n = 99, r = .21, p = .02$ ), and “Did you have serious prolonged anxiety at the time of the collision?” ( $n = 99, r = .38, p < .001$ ). Responses to the history of anxiety questions were also significantly correlated with one another: “anxiety at some time in...life” by “treated...for...anxiety” ( $n = 99, r = .58, p < .001$ ), “anxiety at some time in...life” by “anxiety at...collision” ( $n = 99, r = .39, p < .001$ ), and “treated...for...anxiety” by “anxiety at...collision” ( $n = 99, r = .48, p < .001$ ).

Questions about the patients’ history of a stress reaction (trauma symptoms, possibly PTSD) were not as well developed as questions regarding history of depression or anxiety. The most direct question was “Has a doctor ever told you that you may have had a serious reaction to stress?” which was significantly correlated with the DTS total score (hypothesis 4 continued,  $r = .24, p = .009$ ).

Exploratory analyses were performed to identify possible relationships between the DTS total score and questions that might indicate prior trauma (hypothesis 4 exploratory). In the first

analysis, the combined number of stressful events both within the 12 months before the collision and prior to 12 months before the collision was significantly correlated to the DTS total score ( $r = .38, p < .001$ ). The number of collisions “in the last year” was also found to be significantly correlated to the DTS total score ( $r = .27, p = .008$ ), although no relationships were found with the number of collisions “in your [the patient’s] life” ( $r = .05, p = .61$ ), the number of times injured in collisions “in the last year” ( $r = .17, p = .09$ ), or the number of times injured in collisions “in your [the patient’s] life” ( $r = .06, p = .58$ ). Also, the question “Have you ever had any injury this severe or more severe?” was not correlated to the DTS total score ( $r = .09, p = .39$ ).

Perception of personal control over “events that caused the collision” (a past event) was significantly correlated to the CES-D total score (hypothesis 5,  $r = .21, p = .02$ ) such that the greater the perception of personal control over the events that cause the collision the more depressive symptoms a patient was likely to report. Perception of control by others or by God/Higher Power over “events that caused the collision” was not significantly correlated to the CES-D total score ( $r = -.01, p = .93$ ;  $r = .03, p = .77$  respectively),

Perception of personal control over “your [the patient’s] life in general right now” (a present event) was significantly negatively correlated to the CES-D total score (hypothesis 6,  $r = -.38, p = <.001$ ) such that those who perceive greater control over their lives in general report fewer depressive symptoms. Perception of control by others or by God/Higher Power over “your [the patient’s] life in general right now” was not significantly correlated to the CES-D total score ( $r = .05, p = .61$ ;  $r = .05, p = .66$ , respectively).

Contrary to hypothesis, perception of personal control over “your [the patient’s] recovery process right now” (also a present event) was not correlated to the CES-D total score (hypothesis

6 continued,  $r = -.06, p = .28$ ). Although, others control over “your [the patient’s] recovery process right now” was significantly negatively correlated to the CES-D total score ( $r = -.20, p = .05$ ) suggesting that when the patient perceives others as having a high degree of control over their recovery process they are likely to have fewer depressive symptoms. Perception of control by God/Higher Power over “your [the patient’s] recovery process right now” was not correlated with the CES-D total score ( $r = .02, p = .84$ ).

Further, contrary to hypothesis, perception of personal control in “preventing a collision like this from happening to you [the patient] again” (a future event) was not correlated with the CES-D total score (hypothesis 7,  $r = .14, p = .08$ ). Perception of control by others or by God/Higher Power in “preventing a collision...” was also not correlated with the CES-D total score ( $r = .08, p = .41$ ;  $r = .04, p = .71$  respectively).

#### Other Exploratory Analyses

Feeling guilty about the collision was significantly correlated with greater perception of control over the “events that caused the collision” ( $r = .35, p = <.001$ ) such that those who reported a greater perception of control were more likely to feel guilty about the collision. Guilt was also associated with the CES-D total score ( $r = .19, p = .03$ ). No relationship was found between being “found legally liable or issued a ticket for this [the] collision” and feeling guilty ( $r = .13, p = .19$ ). Patients who thought they were going to die were significantly more likely to have a high DTS total score ( $r = .40, p = <.001$ ).

## CHAPTER 7

### DISCUSSION

#### Overview of the Study

The major goals and hypotheses of the study were designed to confirm findings in previous research (e.g., confirm that collision survivors experience psychological distress), investigate an alternate approach to assessment (e.g., use a questionnaire as opposed to a diagnostic interview) and explore new avenues in trauma theory (e.g., how perception of control of temporal events relates to symptoms of depression). Limited exploratory analyses were used to investigate the strength of relationships between select questions and the Center for Epidemiologic Studies Depression Scale (CES-D) and Davidson Trauma Scale (DTS) total scores. This study is the first of a potential series of studies to use the questionnaire and the data it provided. Due to the enormity of the data set, much of the data was not analyzed and will not be discussed as it is beyond the scope of this study.

#### Characteristics of the Sample

##### Demographics

Data were collected at an Illinois Level 1 trauma hospital that serves the general community. Voluntary participants were 100 English speaking inpatients, 16-years-old or older, who were receiving some rehabilitation, and were involved in transportation-related collisions.

Collision rates by gender and age followed traditional trends. More males (58%) than females (42%) were involved in collisions and the gender differences are comparable to those of the national fatality rates by gender (e.g., males were responsible for 70% of traffic fatalities in

2005; NHTSA, 2006). Mean age of the sample was 38.8 years, which was very similar to the mean age of 39.4, found in Wu and Cheung's (2006) study of 596 motor vehicle collision survivors. The percentages of collisions by age group were also similar to national fatality statistics. For example, 16- to 24-year-olds in the sample accounted for 27% of the transportation-related collisions as compared to 24% in the national fatality statistics (NHTSA, 2006; see Table 2). As has been found in other studies, participants who were young and male were at the greatest risk for collisions.

The race/ethnicity of the sample was relatively similar to state and national trends although there were approximately 10% fewer Caucasians (not Hispanic), 15% more African Americans (Black), and no Asian Americans in the sample (2005 US Census Bureau, n.d.; see Table 3). English was the primary language for 95% of the sample and no patients indicated a problem reading English. The sample's educational attainment was remarkably similar to national trends (see Table 4).

The hospital's catchment area included communities with varying ranges of socioeconomic status. Household incomes of the sample were near those of the state and show a similar bimodality: modes in the sample data were \$10,000-25,000 and \$80,001-120,000 and modes in the Illinois data were \$10,000-24,999 and \$50,000-74,000 (US Census Bureau Economic Characteristics 2000, n.d.; see Table 5, note: the income ranges for the sample's eight response choices are not equal and are not directly comparable to the income ranges of the state). Overall, in terms of demographics, the sample appears to be a very good representation of the population.

## Alcohol and Drug Use

The sample's baseline and collision concurrent rates of alcohol and drug use were higher than those of the general population. Forty-three patients reported consuming at least one alcoholic drink per week and the average number of drinks per week was 3.87, although some patients were very heavy drinkers (e.g., five patients reported drinking 23 or more drinks per week). Eighteen patients (18%) responded affirmatively to two or more questions on the CAGE indicating clinical significance. This is much higher than the 8.6% rate previously identified by the CAGE as the prevalence rate in the general population (Lairson et al., 1992). Collision concurrent alcohol and drug use was high; 27 patients (27%) had mention of alcohol use and 13 (13%) had mention of drug use in their medical chart (some patients may have had both). These rates fall between the estimated national rates of non-fatal (7%) and fatal (39%) alcohol-related motor vehicle collisions (2005 data; NHTSA, 2006).

## Head Injury

According to the medical chart records, one quarter of the sample was noted to have sustained a head or brain injury. Glasgow Coma Scale (GCS) scores indicated that 3 patients had a severe brain injury and 4 had a moderate brain injury upon admission. However, because no significant differences were found on CES-D, Beck Anxiety Inventory (BAI), or DTS total scores between head injured and non-head injured patients, the data of head injured and non-head injured patients remained pooled for all subsequent analyses.

It was not particularly surprising that the CES-D, BAI, and DTS total scores were not significantly different for head injured and non-head injured patients. It is likely that most patients with a low GCS score upon admission had a higher score at the time of participation in

the study due to natural recovery processes (e.g., a patient knocked unconscious by the collision regains consciousness). Further, like all participants in the study, head injured patients went through a brief screening process prior to participation (the status of head injured or not head injured was not known at the time of the screening). Only patients appearing to have the cognitive fitness to complete the questionnaire were allowed to participate.

### Posttraumatic Growth

It seems ironic that a serious collision would bring positive change to an individual's life. However, 50 of the 99 patients reported that the collision event changed their life for the better. Only 21 patients reported that the collision event changed their life for the worse and the remainder reported that their life had not changed at all. The reasons for positive change are not clear, but there are data supporting positive change.

While completing the questionnaire, many patients spontaneously talked about the questions as they were responding to them; several patients gave anecdotal reasons for their positive change. Some reported that during or shortly after the collision they thought that they might die, or at least had come close to dying, and the potential loss of their life made them appreciate living even more. Others reported the belief that the collision was a "wake-up call" clearly meant to warn them that their present course in life was not good and that they should make changes. Still others reported the feeling that they had been offered a new opportunity, as in: "Someone gave me the chance to make a new start in life."

Despite the anecdotal attributions made by patients, there were changes in social support and relations with family, friends, and God/Higher Power that may have helped induce positive change. Ninety patients reported that a family member or friend had been checking on them



regularly since the collision. When patients were asked how much social and emotional support they felt they had, 48 reported “total support,” 46 reported “some” or “much support,” and only 5 patients reported having “little” or “no support.” When asked if the collision had brought them closer to family or friends, 70 patients reported that it had. Further, of the 95 patients who reported believing in God/Higher Power, 64 reported that the collision brought them closer to God/Higher Power. Clearly the majority of patients felt they had frequent contact and support from family and friends and that the collision had somehow changed their relationships, bringing them closer to family, friends, and God/Higher Power.

### Characteristics of the Collision

#### Type of Transportation

The types of transportation (e.g., car, motorcycle, pedestrian) used by the sample were compared with 2005 national motor vehicle transportation by injury and transportation by fatality data (NHTSA, 2006; see Table 6). Interestingly, the sample data most closely matches the transportation by fatality data. It is likely that the transportation by injury data contain a wide range of injuries from minor to life threatening whereas the sample data contains only those whose injuries were severe or life threatening, categories that are nearer to fatal.

Another possibility is that the transportation by injury data is not entirely accurate. The national injury and fatality data are based on police reports filed when the police are called to the scene of a collision. There may be collisions involving motorcyclists, pedal-cyclists, and pedestrians where property damage is minimal, injuries are less than severe, and the police are not called. Conversely, it is likely that the police are called to the scene of most car, truck, and van collisions even when damage is minimal and injuries are less than severe. In this study, even

though patients in the sample were injured and not killed, the police were very likely to have been called to the scene of the collision due to the severity of the collision and injuries sustained. In short, the sample's data and the national transportation by fatality data may reflect those types of collisions where the police are consistently called to the scene.

### Seatbelt and Helmet Use

Seatbelt use in the sample was very consistent with national rates (NHTSA, 2006; see Table 7). Helmet use, however, was 9% lower than national rates (e.g., 39% and 48%, respectively; NHTSA, 2006). Although, this difference may be more a reflection of statistical error due to the small number of helmet wearers ( $n = 13$ ) in the sample than a trend in low rates of helmet use.

### Characteristics of the Traumatic Event

Most of the participants in this study were involved in a transportation-related collision classifiable as an extreme traumatic stressor. To review, extreme traumatic stressors are those events that involve actual or threatened death or serious injury, or threat to one's physical integrity; or witnessing an event that involves death, injury, or a threat to the physical integrity of another person; or learning about unexpected or violent death, serious harm, or threat of death or injury experienced by a family member or other close associate. The person's response to the event must involve intense fear, helplessness, or horror (*DSM-IV*, 1994).

Evidence for the severity of the collision includes: 16 patients had a vehicle rollover, 32 patients were trapped or pinned in the wreckage, for 15 patients extraction from the wreckage took more than 11 minutes and for another 7 patients it took more than 45 minutes, 3 patients

were burned, and over half the patients lost consciousness at some time during or just after the collision. Cognitive and emotional reactions to the collision included: 41 patients had one or two dissociative symptoms (e.g., derealization; depersonalization; amnesia; emotional numbing, detachment, or absence of emotional responsiveness; or a reduction in awareness of the surroundings), another 28 had three or more dissociative symptoms, and 40 patients had thoughts that they might die (note: as found in prior studies, thoughts of death were significantly correlated to trauma symptoms, in this case the DTS total score).

Besides experiencing personal injury, 23 patients witnessed the serious injury of a person known to them (e.g., family, friend, or coworker) and one known person died; 14 patients witnessed the severe injury of a person unknown to them and in 3 cases an unknown person died.

Objective and subjective ratings of the severity of the patients' injuries were in good accord. In Wu and Cheung's (2006) sample of 596 motor vehicle collision survivors, patients were qualified into one of four categories of injury severity:

- 1) *Mild*: operation or plaster of Paris (POP) not required, GCS = 15
- 2) *Moderate*: operation or POP required, GCS = 15
- 3) *Severe*: required hospital admission, GCS = 14 or 15
- 4) *Life threatening*: required hospital admission, GCS = 13 or below

In comparison, all patients in this study would have been placed in Wu and Cheung's two highest injury categories: severe and life threatening. When patients in the sample were asked to rate the severity of their injuries, 66 of the 100 patients reported their injuries were "severe" or "extreme/life threatening."

Injuries typically caused severe pain and were debilitating. The average level of pain since the time of the collision (rated on a 0-9 scale) was very high for most patients; 36 patients

rated their pain as a 9 (*Extreme pain*) and another 50 patients rated their pain as a 6, 7, or 8. Some degree of continuing disability was expected by about half the sample: 48 patients thought they would be at least partially disabled by their injuries in 3 months and 19 thought their disability would last at least 12 months. Further, 44 thought they would never be the same again.

### Measures of Distress

This study employed the symptom inventory scores of the Center for Epidemiologic Studies Depression Scale (CES-D), Beck Anxiety Inventory (BAI), and Davidson Trauma Scale (DTS) to assess psychological distress in collision survivors. It was not possible to make diagnoses (e.g., major depressive disorder, generalized anxiety disorder, or posttraumatic stress disorder [PTSD]) for several reasons: 1) patients did not undergo a clinical assessment by a psychologist or psychiatrist, 2) diagnoses are not to be based on symptom inventory measures alone, and 3) most diagnoses require symptoms to be present for a certain length of time (e.g., two weeks, one month) before a diagnosis can be made and not enough time had passed from injury to assessment/data collection.

### Depression Inventory

In the sample, 26 patients had a CES-D total score indicating severe depression, likely to be a major depression, and another 29 had a score indicating mild to moderate depression. Compared to the estimated lifetime prevalence rates of a major depressive disorder, 10-25% for females and 5-12% for males (*DSM-IV*, 1994), the samples single incident rates were very high.

The typical female to male ratio for major depression is 2:1 (*DSM-IV*, 1994). In the sample, more females ( $n = 15$ ) than males ( $n = 11$ ) had high CES-D total scores, but the ratio was not quite 2:1. However, there were fewer females ( $n = 42$ ) than males ( $n = 58$ ) in the sample

and had there been an equal number of female and male participants, the typical gender ratio may have been found.

### Anxiety Inventory

In the sample, 20 patients had a BAI total score indicating severe anxiety and another 30 had a score indicating moderate anxiety. Again, rates of severe anxiety were very high when compared to the estimated lifetime prevalence of 5% (*DSM-IV*, 1994).

The typical female to male ratio for a generalized anxiety disorder is also 2:1 (*DSM-IV*, 1994). In the case of anxiety symptoms, more females ( $n = 14$ ) than males ( $n = 6$ ) had high BAI total scores and the gender ratio was approximately 2:1 despite having fewer females in the sample. BAI total scores also showed two other trends that have been found in prior studies, BAI total scores were higher for women than for men and higher for younger patients compared to older patients.

### Trauma Inventory

In this study, estimates of acute stress disorder (ASD) or posttraumatic stress disorder (PTSD) were based on the total number of post-collision dissociative symptoms and/or the DTS total score. None of the dissociative symptom questions or items on the DTS use the exact same wording as presented in the *DSM-IV* (1994) ASD or PTSD diagnostic criteria, but they are very similar and are designed to correspond to the items in those criteria.

In the sample, 22 patients endorsed symptoms matching *DSM-IV* (1994) ASD diagnostic criteria B, C, D, and E and represent those in the sample most likely to have ASD. Twenty-seven patients had a DTS total score of 37 or higher indicating a clinically significant level of trauma

(4 to 1 ratio of PTSD to non-PTSD at a score of 37 or higher per Davidson, 2003). Further, 23 patients endorsed symptoms matching the *DSM-IV* (1994) PTSD diagnostic criteria B, C, and D and 19 of those 23 also had a DTS total score indicating a clinically significant level of trauma. This group of 19 conservatively represents those in the sample most likely to have PTSD.

### Estimated Rates of Distress

As previously stated, the CES-D, BAI, and DTS are symptom inventories and are not, by themselves, meant to provide diagnoses. However, by using the cutoff score criteria (e.g., CES-D total score of 22 or higher indicates a probable major depression) some speculative estimates of diagnoses can be made. In this sample, there would be 26 cases (26%) of major depression, 20 cases (20.2%) of severe anxiety (possibly generalized anxiety disorder), 22 cases (22%) of acute stress disorder, and 19-27 cases (19-27%) of posttraumatic stress disorder depending on whether the most conservative criteria are used (e.g., high DTS total score, 27%; *DSM-IV* [1994] PTSD criteria alone, 23%; *DSM-IV* [1994] PTSD criteria and a high DTS total score, 19%)

Direct comparison of these rates to the findings of other studies is not possible due to the varied methods of conducting post-collision/post-trauma research. Comparisons are complicated by such factors as the type and severity of trauma, type of assessment and measures used, length of time to assessment, differing populations, and more.

### Comorbidity in Measures of Distress

As hypothesized, the CES-D total score was significantly correlated with the BAI total score (hypothesis 1), the DTS total score (hypothesis 2), and mention of alcohol or drug use at the time of the collision (hypothesis 3). This is consistent with the relationship of comorbidities

for major depressive disorder (e.g., “anxiety disorders, psychosocial stressors, and substance-related disorders”), generalized anxiety disorder (e.g., “major depression, conditions associated with stress, and substance-related disorders”), and PTSD (e.g., major depression, generalized anxiety disorder, and substance-related disorders;” *DSM-IV*, 1994).

These findings support the use of questionnaire-based symptom inventories as effective means of identifying psychological distress within days to weeks of a traumatic collision. While formal diagnoses were not made with the CES-D, BAI, and DTS, the symptom total scores obtained with them relate to one another like formal diagnoses.

Alternately, it is possible that the CES-D, BAI, and DTS measure some of the same symptoms, which would contribute to their comorbidity. However, the disorders themselves (Major Depressive Disorder [MDD], Generalized Anxiety Disorder [GAD], and PTSD) upon which the symptom measures are based have some overlapping symptoms (e.g., restless, fatigue/low energy, difficulty concentrating).

Other studies have found a very high degree of comorbidity between PTSD and other disorders. Kessler et al. (1995) reported that nearly 50% of individuals with PTSD have 3 or more additional diagnoses. Davidson et al. (1991) reported that those with PTSD were 10 times more likely to have diagnoses of major depressive disorder or generalized anxiety disorder. Regardless of shared symptoms, the CES-D total score correlates with anxiety symptoms, PTSD symptoms, and mention of alcohol/drug use as anticipated.

#### Relationships between Prior and Current Distress

As hypothesized, there was a significant positive correlation between a patient’s self-reported history of depression, anxiety, or stress reaction and the symptom inventory total score

of the CES-D, BAI, and DTS, respectively (hypothesis 4). This finding is consistent with most but not all studies which have found that having a psychiatric history increases the risk for subsequent psychological problems (Blanchard & Hickling, 1997; Chubb & Bisson, 1996; Kuch et al., 1996; Smith et al., 1990; not found in Gregg et al., 1995).

## Depression

Some sense of the interaction between the patients' history of depression and current symptoms of depression can be seen by comparing the patients' self-reported history of serious depression and serious depression at the time of the collision with high symptom inventory scores on the CES-D (e.g., scores 22-60 indicating a probable major depression; see Table 11).

To review, 49 patients reported a history of serious depression, 13 reported having serious depression at the time of the collision, and 23 reported having received treatment for depression from a doctor. Correlations between the patients' CES-D total score and the patients' history of depression, depression at the time of the collision, and treatment for depression were all significant. Further, the patients' history of depression, depression at the time of the collision, and treatment for depression were significantly correlated with one another.

Most patients ( $n = 45$ ) report no history of serious depression or depression at the time of the collision and did not have a high total score on the CES-D. Those with high scores on the CES-D ( $n = 26$ ) can be broken down into three groups: 1) new onset depression ( $n = 6$ ), those with no history of depression and no depression at the time of the collision, but a high score on the CES-D; 2) relapse ( $n = 13$ ), those with a history of depression and a high score on the CES-D, but no reported depression at the time of the collision; and 3) continuation of a depressive



episode ( $n = 7$ ), those with a history of depression, depression at the time of the collision, and a high score on the CES-D.

There were also many patients ( $n = 23$ ) who report a history of serious depression, but who had no depression at the time of the collision and did not have a high CES-D total score. These may be individuals whose depression was due to a specific and transient psychosocial stressor such as death of a significant person, divorce, or financial difficulties. They may have had a major depression but had a full recovery with no recurrence. Further, they may have started a medication or learned coping skills that have increased their resiliency and helped to defend against further depressive episodes. Or, perhaps for these patients the collision was not traumatic enough to cause a relapse or there has not been enough time for a relapse to fully realize.

A more curious group are those patients ( $n = 6$ ) that report a history of serious depression and depression at the time of the collision, but who did not have a high score on the CES-D. While seemingly unlikely, this group could have had some improvement in mood since the time of the collision possibly due to a change in perspective (posttraumatic growth) or increased social support. Or, while they may have had serious depressive episodes in the past, they were in a dysthymic state (a less severe form of depression) at the time of study participation and did not achieve a high score on the CES-D.

Of note, the two questions regarding history of depression hold the possibility of being completely subjective; while some patients may have been formally assessed and diagnosed as depressed, others may just believe that they have been seriously depressed without external validation. The inclusion of a question regarding the patients' current state of depression may have added insight into the patients' perception of serious depression. For example:

“Have you been seriously depressed at some time in your life?”

“Did you have serious depression at the time of the collision?”

“Do you have serious depression right now?”

Were the third question to have been included, a comparison could have been made between the CES-D total score and the patients’ subjective reports of current depression giving some external validation to the patients’ perception and report of serious depression. Alternately, questions could have inquired about actual diagnoses (e.g., “Have you been diagnosed with depression at some time in your life?”). However, patients may not know if they have been diagnosed or the name of the specific diagnosis.

## Anxiety

Some sense of the interaction between the patients’ history of anxiety and current symptoms of anxiety can be seen by comparing the patients’ self-reported history of serious prolonged anxiety and serious prolonged anxiety at the time of the collision with high symptom inventory scores on the BAI (e.g., scores 26-63 indicating severe anxiety;  $n = 99$ ; see Table 12).

To review, 30 patients reported a history of serious prolonged anxiety, 15 reported having serious prolonged anxiety at the time of the collision, and 6 reported having received treatment for serious prolonged anxiety from a doctor. Correlations between the patients’ BAI total score and the patients’ history of anxiety, anxiety at the time of the collision, and treatment for anxiety were all significant. Further, the patients’ history of anxiety, anxiety at the time of the collision, and history of treatment for anxiety were significantly correlated with one another.

Most patients ( $n = 59$ ) report no history of serious prolonged anxiety or anxiety at the time of the collision and did not have a high score on the BAI. Those with high scores on the BAI ( $n = 20$ ) can be broken down into three groups: 1) new onset anxiety ( $n = 10$ ), those with no

history of anxiety and no anxiety at the time of the collision, but a high score on the BAI; 2) relapse ( $n = 5$ ), those with a history of anxiety and a high score on the BAI, but no anxiety at the time of the collision; and 3) continuation of an episode of anxiety ( $n = 5$ ), those with a history of anxiety, anxiety at the time of the collision, and a high score on the BAI.

There were also patients ( $n = 19$ ) who report a history of serious prolonged anxiety, but who had no anxiety at the time of the collision and did not have a high score on the BAI.

Possible explanations for their response pattern are similar to those who only had a remote history of depression: they may have had an anxiety disorder in the past but have had a full recovery with no recurrence, they may have started a medication or learned coping skills that have prevented further anxious episodes, the collision may not have been traumatic enough to cause a relapse, or there may not have been enough time for a relapse to fully realize.

There was only one patient who reported a history of serious prolonged anxiety and anxiety at the time of the collision, but no high score on the BAI. It is possible that this patient had some reduction in anxiety since the time of the collision due to change in perspective (posttraumatic growth) or increased social support, or perhaps the patient's subjective report of anxiety has remained the same, but the patient does not score high on the BAI.

Again, by including an additional question regarding anxiety at the present time (e.g., "Do you have serious prolonged anxiety right now?"), a comparison could have been made between the BAI total score and the patients' subjective reports of current anxiety giving some external validation to the patients' perception and report of serious prolonged anxiety.

## Trauma

As previously stated, questions regarding the patients' history of a stress reaction (trauma symptoms, possibly PTSD) were not as well developed as the questions regarding the patients' history of depression or anxiety. The most direct question asked was, "Has a doctor ever told you that you may have had a serious reaction to stress?" which was significantly correlated to the DTS total score. Several other questions were considered as possible indicators of prior trauma and through limited exploratory analysis these questions were compared to the DTS total score.

The first questions considered were those regarding the number of "extremely stressful events" a patient had experienced both in the 12 months before the collision and in the time prior to 12 months before the collision. The most commonly reported stressful events were death of a family member or friend, serious personal illness/injury, financial crisis, loss of job, end of a non-marital relationship, family member who was alcoholic, and military/war service. The total number of stressful events for both time periods combined was significantly correlated to the DTS total score.

The second questions considered were those regarding the patients' history of transportation-related collisions and number of injuries sustained in those collisions. The number of collisions in the last year was found to significantly correlate with the DTS total score. No relationships were found between the DTS total score and the lifetime number of collisions, number of times injured in collisions in the last year, or number of times injured in collisions in the lifetime.

The third and final question to be considered was "Have you ever had any injury this severe or more severe?" Responses to this question were not correlated to the DTS score.

## Perception of Control

### Personal Control of Past Events

As hypothesized, perception of personal control over the events that caused the collision was significantly correlated with the CES-D total score (hypothesis 5) such that those with a greater perception of control were more likely to have depressive symptoms. This finding is in accord with those of Frazier et al., (2002) and Joseph et al. (1991) and the theory that greater perception of control over traumatic events of the past leads to psychological distress.

Although most traumatic events are uncontrollable and not intentionally produced (Skinner, 1996), some patients might believe that the events leading to the collision were controllable and someone (self or others) failed to maintain control (e.g., failure to stop at a stop sign causes a collision). Regardless of actual controllability, the cognitive processes associated with belief in either the controllability or uncontrollability of a traumatic event could lead to distress. For example, an internal thought process about the uncontrollability of the event might be: “A bad thing happened to me and I couldn’t do anything about it...I am helpless to prevent bad things from happening...why try to do anything about them.” This process is supported by Chorpita and Barlow’s (1998) hypothesis that experiencing uncontrollable events increases the likelihood that subsequent events will also be perceived as uncontrollable which leads to the development of depression and anxiety. This process is also supported by animal research showing that exposure to uncontrollable and unpredictable aversive events leads to PTSD-like symptoms (Foa et al., 1992).

An internal thought process about the controllability of the event might be: “I was at fault in the collision...I did something bad...I feel bad about doing it.” This thought process might lead to considerable guilt, shame, or regret. In support of this an exploratory analysis found that

patients who reported greater control over the “events that caused the collision” were more likely to report feeling guilty about the collision. It follows those individuals who perceive little or no control of a traumatic event would not be burdened by feelings of responsibility and therefore would be less likely to have guilt. Unfortunately, the patients’ actual beliefs about the controllability or uncontrollability of the events that caused the collision are not known.

It was considered that patients responding affirmatively to the question, “Were you found legally liable or issued a ticket for this collision?” might be those who actually were in control of the events that caused the collision (e.g., failed to stop at a stop sign) and knowledge of their control might lead to feelings of guilt. However, in another exploratory analysis, no relationship was found between guilt and being found legally liable or issued a ticket. Although, it is not known to what extent those who were found legally liable or issued a ticket were actually in control.

Patients who felt guilty about the collision ( $n = 40$ ) were also significantly more likely to have a higher CES-D total score. However, as guilt is a symptom of depression, a correlation between guilt and depressive symptoms is not unexpected nor does it help to illuminate a cause and effect relationship (e.g., guilt causes depression vs. guilt as a result of depression). It is interesting to note that the magnitude of the relationship is stronger between guilt and perception of control over events that caused the collision than between guilt and the CES-D total score.

#### Personal Control of Present Events

There were two questions that inquired about perception of personal control of present events: “How much control do you have over your recovery process right now?” and “How much control do you have over your life in general right now?”

As hypothesized, perception of personal control over “your life in general right now” was significantly correlated with the CES-D total score (hypothesis 6, part 1) such that those with a greater perception of control over their life in general were less likely to have symptoms of depression. This finding is in accord with results of other studies; no study found present perception of personal control to be associated with poorer adjustment, it is almost always associated with better adjustment (Frazier et al., 2002).

Contrary to hypothesis, perception of personal control over “your recovery process right now” was not correlated with the CES-D total score (hypothesis 6, part 2). In this case, no relationship was found between the patients’ perception of control of the recovery process and the number of depressive symptoms. However, a significant negative correlation was found between the CES-D total score and a perception of control by others over the patients’ recovery process right now. In this case, when the patients’ perception of control by others was higher the CES-D total score was likely to be lower. It should be noted that in terms of actual amount of control, patients perceived more personal control over their recovery process than they did others control of their recovery process, but others control was significantly related to the CES-D total score whereas personal control was not.

This finding is not in accord with the research reviewed by Frazier et al. (2002) in which it was noted that perception of personal control of present events is most often conceptualized in terms of control over medical issues and perception of personal control is almost always associated with better adjustment. It is very likely that patients conceptualize the question “How much control do you have over your recovery process right now” in terms of their medical issues. However, having personal control over medical issues may not be in the patients’ best interest so shortly after a traumatic collision.

It is suggested that for this particular question patients are likely to believe that the only others who would reasonably have control of their “recovery process right now” refers to their medical team. Further, the patients in this study sustained injuries so severe that recovery is beyond their own means. It is likely that a sense of dependency upon the medical team is formed and in this case it is wiser to allow the medical “experts” to have control. This position of dependency may lead to a range of feelings including: “I am confident in my medical team and this reassures me,” or, “I am not confident in my medical team and am therefore feeling helpless and distressed.” Both of these statements are consistent with the present findings. Overall, it makes intuitive sense that patients are likely to feel better when they have confidence in the care they receive from their medical team.

#### Personal Control of Future Events

Contrary to hypothesis, perception of personal control in preventing a future collision was not correlated with the CES-D total score (hypothesis 7). This finding is in contrast with Frazier (2000) and others (Carver et al., 2000; Helgeson, 1992; Newsom et al., 1996; Reed et al., 1993) who found that a perception of personal control over future events is generally associated with less distress and better adjustment.

Responses to questions of future control were mixed; only 13 more patients reported total control ( $n = 33$ ) than reported some control ( $n = 20$ ) or no control ( $n = 20$ ). There are no clear reasons for lack of a correlation between mood and perception of control of future collision prevention, although it seems reasonable that patients who felt they would have more control over future events would be more at ease.



Perhaps patients do not know if future collision events are controllable. Certainly most patients ( $n = 54$ ) felt they had no control over the events that caused the collision. It is unusual that so many patients ( $n = 54$ ) would report no control over the events that caused the collision, but tend to believe that they would have more (or total,  $n = 33$ ) control of a future collision.

Maybe future collisions are seen as too unlikely an event to happen again. In support of this, 49 patients reported that it was “very unlikely” or “unlikely” that an event this bad or worse would happen again; 46 reported “It’s possible,” and 4 reported that it is “likely” or “very likely.” Or, possibly depressive symptoms are simply unrelated to beliefs about future control.

#### Control by Others and God/Higher Power

Perception of control by others and by God/Higher Power was also compared to the CES-D total score for all temporal periods (past, present, and future). As was previously discussed, there was a significant negative correlation between a perception of control by others over the patients’ recovery process and the CES-D total score. For all other time periods there was no relationship between the CES-D total score and control by others or by God/Higher Power. Perception of God/Higher Power’s control of events from all temporal periods appeared more dichotomous (e.g., people either thought God/Higher Power had a lot of control or very little control).

Overall, this study’s perception of control findings suggest that the agent of control most related to mood is the self. This is reasonable because the self is the most tangible agent, the term others is likely too vague and/or too dependent on the participant’s situation (e.g., in this study it is likely that patients perceived others as medical staff), and not everyone believes in God/Higher Power.

Interestingly, ratings of control over an event (e.g., “How much control did you have over the events that caused the collision?”) were not always reported as mutually exclusive. For example, patients may have stated that they, others, and God/Higher Power had a relatively high degree of control over an event or that no agent had a high degree of control. It could, therefore, have been possible to find a significant correlation between perception of control and the CES-D total score for more than one agent of control (e.g., self, others, or God/Higher Power) per temporal period (past, present, or future) although this was not found.

### Elements of the Research Design

#### Hospitalization and the Recently Injured Sample

While this study is unable to confirm whether symptoms of depression, anxiety, or PTSD are more or less acute when patients are initially hospitalized compared to some time in the future, it was apparent that many patients had acute psychological distress (e.g., 26% of sample had a CES-D score indicating probable major depression). These patients are likely to fare better if their psychological issues are addressed during the initial hospitalization.

Addressing issues might entail a mix of treatment and prevention that is meant to increase coping skills, educate the patient about signs and symptoms of distress, outline options for treatment, and help the patient build lasting social and emotional support systems. Addressing medical and psychological issues simultaneously supports the perspective of injury and recovery of the individual as an integrated whole, and lends validity to the patient’s “reasons” for psychological distress. Even if symptoms of distress are not present when the patient is hospitalized, they may be discussed as a potential possibility and screening of all patients could ensure that cases are not overlooked.

Healthcare providers have a unique and possibly critical opportunity and responsibility to address the patient's needs while hospitalized and the hospital setting is conducive to addressing those needs. Hospitalized patients expect to discuss and deal with their health-related concerns and may feel less stigmatized by addressing psychological issues while at a "medical facility." More often psychologists are being included into medical treatment teams. For the patient, this means more comprehensive care. For the hospital-based psychologist/researcher, it provides the opportunity to triage, observe, assess, protect, treat, and stabilize the patient as needed.

There were several noted benefits associated with conducting research in a hospital setting. Most hospital patients were willing to be study participants. Some even appreciated the opportunity to perform a task, saying, "It will give me something to do." It was observed that while completing the questionnaire many patients spontaneously talked about their collision experience; they expressed feelings, concerns, and wonder as they struggled to accept and integrate the traumatic event. Participation in the study also gave patients and their families a reason to talk about trauma-related feelings that might otherwise have not been discussed.

There were also several noted difficulties associated with conducting research in a hospital setting. Primarily, there was a lack of control of the environment. Hospitals can be very busy places and patients often have little say in the scheduling of their care. They may be taken for surgery, CT scans, or physical therapy when these services become available; doctors, nurses, patient care technicians, phlebotomists, and respiratory therapists may require the patient's time without warning; and telephone calls and visitors may present unexpectedly, all interrupting participation in the research study. Patients may fully intend to participate, but due to unexpected treatments, transfers, discharges, or other scheduling difficulties do not complete the study tasks.

Further, the patient's medical condition may interfere with the patient's ability to perform the research task. Medications and fatigue may cause drowsiness or induce sleep, pain may consume the patient's attention and energy, and specific injuries may impede communication. Despite the difficulties of working within the hospital setting, the opportunity to assess and treat patients so shortly after a traumatic event outweighs the drawbacks.

#### Use of a Questionnaire

It was anticipated that use of a questionnaire would yield data similar to that gained by a clinical interview, but require less time, training, or expenditure on the part of the healthcare provider. It was found that the primary benefit of using a questionnaire with an inpatient medical population was the option for patients to complete the questionnaire when time and health issues permit. Patients were able to work between treatments, at times when they felt more rested, when visitors had gone or, alternately, when visitors were present and able to assist with the questionnaire. As anticipated, the questionnaires were inexpensive and easy to administer to one or more patients at a time.

Several drawbacks to using a questionnaire were noted. The quality of information gained through use of a questionnaire is highly dependent on the quality of the questions. While this is similar in an interview, the interview allows a flow of conversation, optional investigation, and a focus on important issues. There were patients who mentioned that the questionnaire was too long or they would have preferred a verbal interview. For others, reading the questionnaire was a problem because their glasses or contacts were broken, with family for safekeeping, or otherwise not at the hospital. Lastly, some patient's injuries made completing the questionnaire difficult, although patients were usually able to overcome problems by getting assistance.

## Sudden vs. Prolonged or Expected Trauma

As previously stated, all participants in this study experienced a sudden, unexpected, relatively brief, and potentially deadly traumatic event. Their responses may have been different than those whose traumas were more prolonged (e.g., childhood physical abuse), less lethal (e.g., childhood sexual abuse), or somehow expected (e.g., war combat); although it is not known if the sample's responses were different. Possibly those who are exposed to sudden traumatic events retain some sense of the rarity of the event and may expect to return to a "normal life" at some point in time. On the other hand, when individuals are unprepared for sudden and unexpected traumatic events they have no coping skills on which to rely and may therefore have an overwhelming stress response.

## Inclusion of Head Injury Patients

This study included head injured patients along with non-head injured patients. As previously stated, head injury may cause symptoms which resemble depression and anxiety, but which are not. This poses some challenge when designing studies as levels of dysfunction must be considered as well as implementation of statistical controls. There were no signs that inclusion of injured patients was problematic for this study. Head injury is not uncommon and it does not preclude a collision survivor from having psychological distress. It is equally vital to have data for head injured as well as non-head injured patients to ensure appropriate post-collision interventions.

## Multiple Agent and Temporal Perceived Control

Perception of control is an important consideration after exposure to a traumatic event. Knowledge of the patients' perception of controllability and level of perceived personal control may provide some indication of psychological distress and indicate the need for a therapeutic exploration of guilt, shame, and self-blame. In this study, multiple agent temporal control allowed for the considerations of a broader array of agents of control, which may have more realistically represented the actual situation.

Many people believe in God/Higher Power and believe God/Higher Power has a lot of control over past, present, and future events. However, for some patients the inclusion of God/Higher Power as an agent of control raised philosophical issues. Several patients spontaneously stated that they had never considered that God/Higher Power might have control over the events that caused the collision and they found it difficult to reconcile that God/Higher Power would cause or allow hurtful things to happen.

## General and Theoretical Implications

The CES-D, BAI, and DTS symptom inventories appear to be useful indicators of psychological distress in hospitalized transportation-related collisions survivors. They are easily administered and scored, and can be employed in the hospital setting with little expenditure of time or resources. They correlate to history and treatment of depression, anxiety, and stress reaction, and have comorbid relationships similar to those observed in formally diagnosed disorders. These measures may be used as routine screening tools to assess for the need of psychological/psychiatric services and may be used with relatively functional head injured

patients. For the patient, the CES-D, BAI, and DTS are brief, easily comprehensible, and can be completed when health issues and scheduling permit.

Several correlates of psychological distress were noted in this study that may help identify patients with psychological distress. These correlates, asked in question form, may be included in initial and/or follow up assessments throughout the period of hospitalization regardless of whether the CES-D, BAI, or DTS are used. Correlates of the patients' pre-collision history include: remote history of serious depression or serious prolonged anxiety, treatment for serious depression or serious prolonged anxiety, serious depression or serious prolonged anxiety at the time of the collision, a doctor reported reaction to stress, number of stressful events in the lifetime, number of collisions in the last year, and frequency of use of alcohol/drugs.

Correlates to the peri- or post-collision period include: patient thoughts that they might die, guilt regarding the collision, perception of personal control over events that caused the collision with greater control indicating more distress, and perception of personal control over life in general with greater control indicating less distress. Correlates of traumatic growth may include perception of life change for the better; positive change in relations with family, friends, or God/Higher Power; and perception of good social support.

### Limitations

There are several limitations to this study. First, due to its correlational nature, this study was unable to provide proof of cause and effect relationships. The study did, however, describe the statistical strength of the relationships between variables, compare the findings to those of similar studies, and provide some informed speculation as to the possible relationship between

variables. It is hoped that future studies will build on the material presented herein to further understand the nature of the variable's cause and effect relationships.

Second, results of this study are limited to those who were comfortable sharing personal information. Many of the patients who declined participation in the study stated that they were concerned about revealing personal information (e.g., annual household income or alcohol and drug habits) or were concerned about how the revelation of any information might affect impending collision-related litigation.

Third, because the study is questionnaire-based almost all data is self-reported, except data gained from the chart as well as results of the symptom inventory measures. Self-reported data has the potential to be incorrect, not necessarily due to deception although that is a possibility (e.g., patients mis-reporting their consumption of alcohol or drugs), but through faulty recall. In this study there is no way to verify the accuracy of the patients' responses; the majority of the data relies on the patients' memory and willingness to provide precise data.

Fourth, the study's results are based on responses provided by collision survivors who were willing to participate in the study. It is possible that the 25 patients who declined participation had characteristics that were different from the participating patients. Since no information was collected about patients who declined participation, comparisons cannot be made. Anecdotally, it appeared that patients who declined participation were younger, less severely injured, and/or were preparing to discharge from the hospital in the near future.

Finally, the CES-D, BAI, and DTS all contain questions about symptoms of a physical nature (e.g., low energy, poor sleep) as do the diagnoses upon which they are based. These symptoms are generally assumed to be caused by the respondent's psychological distress. However, it is possible that some of the physical symptoms reported by patients in this study



were attributable to the patient's medical condition. This misattribution of symptoms would result in some inflation of the patient's CES-D, BAI, or DTS total score. The degree of such inflation is not known and would be dependent on each patient's unique medical condition. The potential for misattribution of physical symptoms is not isolated to this study alone. It is problematic to similar measures of psychological distress when used with medical populations.

### Internal and External Validity and Generalizability

This study is limited in generalization to those whose medical condition is severe enough to warrant at least several days of inpatient care but not so severe that they could not participate in the study. The latter being patients who suffered severe brain or spinal cord injuries or conditions that left them unable to communicate. As previously stated, head injured patients were included, but generalization to other head injured populations is limited to those who are quite functional at the time of participation (e.g., alert, oriented, with coherent speech, and clear thought processes).

The sample was a good representation of the base population in terms of demographics (e.g., gender, age, race/ethnicity, education, income); there were only slight differences in age and race/ethnicity from state and national statistics. The types of transportation and safety equipment were similar to national rates and appear a fair representation of transportation and safety trends in the US. Rates of distress were not directly comparable to those found in other studies but the relationships between symptoms of distress presented in comorbid fashion as expected. Overall, this study appears to have a very high potential for generalizability.

## Summation

Transportation-related collisions are ubiquitous and result in over 2.5 million injuries and over 40,000 deaths annually. Many collision survivors experience psychological distress, which can affect their ability to recover and return to a pre-collision lifestyle. There is insufficient information on how, when, and to whom psychological distress occurs and which methods of intervention may be the most efficacious. Treatment interventions need to be based on a solid foundation of scientific study defining the types and frequency of psychological distress and how that distress can be best identified through characteristics of the collision survivor, their injuries, and their perceptions of the traumatic event.

This study used questionnaire-based symptom inventory measures of psychological distress (CES-D, BAI, and DTS) with a hospitalized sample of transportation-related collision survivors to confirm the presence and incidence of psychological distress and to explore the relationship between psychological distress and the following: history of distress, comorbidity of distress disorders, perception of control, and select characteristics of the sample including history of alcohol/drug use, perception of injury, fear of dying, guilt, and potential traumatic growth. The sample appeared to be a good representation of the base population and generalizability is expected to be high.

It was found that symptoms of depression, anxiety, and PTSD were present in rates that were anticipated and consistent with prior research. Several variables were found to be correlated to psychological distress including history of psychological distress, history of treatment for psychological distress, and alcohol/drug use, post-collision fear of dying, prior number of collisions in the last year, prior number of stressful events in the lifetime, a greater perception of control of events that caused the collision, and guilt related to the collision. Factors associated

with less distress include a greater perception of control over life in general and there is some evidence suggesting the occurrence of posttraumatic growth.

It is hoped that with the information gained in this study and that of other studies, early and appropriate interventions can be developed to help the collision survivor achieve full recovery and psychological well being.

### Future Directions

There is much to be done in the field of assessment and treatment of transportation-related collision survivors. Gains could be made through continued analyses of the current data, extending the findings of the present study, and conducting research beyond this study.

As previously stated, this study was the first of a potential series of studies to use the questionnaire and the large data set it provided. Further investigations of the present data might confirm the findings of previous research. For example, comparing CES-D, BAI, and DTS total scores with items such as loss of consciousness and social support might confirm that those who lose consciousness tend to have lower rates of traumatization or that social support indeed buffers against traumatic events. Additional analyses could also compare the BAI and DTS total scores with perception of control for all agents and all temporal periods. It may be found that anxiety (BAI) or trauma (DTS) symptoms are better correlated to temporal events than symptoms of depression (CES-D).

Further investigations might explore how historical factors such as satisfaction with job or prior disability relate to self-reported history of depression, anxiety, and stress reactions as well as post-collision levels of distress. This could aid in the development of a history of distress

profile (e.g., prior mental illness, traumatic events, and other negative happenings), which might be useful as a predictor of response to traumatic collisions.

Were further studies to use this study's questionnaire again, some changes would be necessary. For example, some response boxes on the CES-D were quite close to the boxes in either the row above or below which occasionally caused patients to mismark their response. This did not lead to missing or incorrect data because the questionnaires were reviewed for accuracy upon completion and patients were asked to clarify mismarked responses. This problem could easily be rectified by adding more space between rows and/or using shading to delineate rows.

Some patients had difficulty completing the DTS, which was inadvertently placed at the end of the questionnaire behind the CES-D and BAI. The layout (appearance) of the DTS is similar to the CES-D and BAI. Respondents are to read the symptom and state how many times in the last week the symptom was troublesome for them. However, the response choices for the DTS are more complicated than those of the CES-D and BAI. The DTS requires respondents to state both the frequency and severity of the symptom and it uses a five point scale (0, 1, 2, 3, and 4) rather than a four point scale like those found on the CES-D and BAI. It is likely that completion of the DTS would not have been problematic had it been placed before the CES-D and BAI, preferably much earlier in the questionnaire where there would be no association with the CES-D and BAI.

Patients were asked to indicate the number of days since the collision and the response choices were grouped in 15-day increments (e.g., 1-15 days, 16-30 days). These increments were far too large to yield an effective assessment of the time since the collision. The number of days hospitalized, even for very severe injuries, is often under a few weeks. In fact, only 2 of the 100

patients in this study were hospitalized 16 days or more at the time of their participation. Future studies should forgo interval responses and ask directly for the number of days since the collision or get this information from the chart.

In this study not every patient had the same capability to complete the questionnaire and a subjective note of the general categorical level of required assistance was made (e.g., low, medium, or high assistance). It is recommended that future studies better define the type of assistance required. For example, specify whether the patient unable to write or unable to see or if the patient had a poor understanding of the questionnaire. Such specificity may yield evidence for the need to revise the format of the questionnaire (e.g., read all questions aloud to the patients and/or have the researcher record all responses). Further, identifying poorly comprehended questions may lead to evidence of cognitive impairment or the need to revise a question. It is clear that the general categorical ratings of low, medium, and high assistance that were used in this study were of little value.

It would also be beneficial to increase the number of methods available for completing the questionnaire. These may include: 1) a written questionnaire like the one used in this study, 2) a verbal questionnaire where questions are read aloud and responses are recorded by another person, 3) a telephone/computer based questionnaire where patients use the phone in the hospital room to complete a computerized survey, and 4) have questionnaires available in other languages.

Beyond problems with the current questionnaire, it will be important to extend the findings in this study by using the CES-D, BAI, and DTS to periodically assess patients' progress for up to several years. Structured diagnostic interviews could be included in follow up assessments to provide diagnostic validity to the predictive potential of the symptom inventories

scores. It would also be of value to compare outcomes of the CES-D, BAI, and DTS with other symptom inventories to determine the most effective measures of psychological distress for hospitalized patients.

Beyond this study, it may be beneficial to develop empirically supported treatment protocols for traumatized patients that include screening tools, in-hospital methods of intervention and treatment, support for the patient and their family, and appropriate referrals for follow up care.

There is no doubt that transportation-related collisions will continue to occur and without early intervention so will the psychological distress that accompanies them. This study found the CES-D, BAI, and DTS to be useful tools for identifying psychological distress in recently hospitalized collision survivors. Because they are brief, comprehensible, and easy to administer and score in the hospital environment, they may be used for routine screening of psychological distress and the need for psychological/psychiatric services. Progress has been made in the identification of psychological distress and the characteristics that lead to distress, but it is critical that advancements continue towards the development of reliable and valid methods of assessment and intervention.

APPENDIX A  
QUESTIONNAIRE

# PATIENT QUESTIONNAIRE

**INSTRUCTIONS:** The following pages contain questions about your collision and other aspects of your life. Some questions may be sensitive and personal in nature. It is important that you answer all questions honestly. You do not need to put your name on this questionnaire. The information you provide will be kept strictly confidential. Answer questions by marking the box, filling in the blank, or circling the response that is most correct for you. There are no right or wrong answers, only responses that are most true for you. If you have any questions, please ask the research assistant for help.

What is your gender?

Male ☐

Female ☐

What is your age? #\_\_\_\_\_

What is your current Marital Status?

Single (Never married) ☐

Married ☐

Living with significant other ☐

Separated ☐

Divorced ☐

Widowed ☐

What is your racial/ethnic background?

Caucasian (White not Hispanic) ☐

African American (Black) ☐

Hispanic, Latino ☐

Asian American ☐

Native American ☐

Other ☐

What is your primary language?

English ☐

Spanish ☐

Other ☐

How well do you read English?

Very well ☐

Well ☐

Not well ☐



What is your level of education?

- Did not finish high school ☐
- Finished high school or received G.E.D. ☐
- Graduated technical school ☐
- Graduated college ☐
- Graduated higher degree (e.g., MA, MS, MD, PhD) ☐

Did you work for income at any time in the month before the collision? Yes No

If you worked, was it full time? Yes No

If you worked, did you like your job? Yes No

If you worked for income, was your income the...

- Primary source of income for household ☐
- Secondary source of income for household ☐
- Did not contribute to household income ☐

How many people are in your family household? #\_\_\_\_\_

What is the gross annual income for your family household?

- Less than \$10,000 ☐
- \$10,000 – 25,000 ☐
- \$25,001 – 40,000 ☐
- \$40,001 – 60,000 ☐
- \$60,001 – 80,000 ☐
- \$80,001 – 120,000 ☐
- \$120,001 – 200,000 ☐
- More than \$200,000 ☐

Will this collision cause your personal income to decrease? Yes No

Do you support dependents (e.g., children, spouse, elderly relative)? Yes No

Were you limited by a physical disability before this collision? Yes No

How many days has it been since your collision?

- 01 – 15 days ☐
- 16 – 30 days ☐
- 31 – 45 days ☐
- 46 – 60 days ☐
- 61 – 75 days ☐
- 76 – 90 days ☐
- 91 days or more ☐

Were you driving, riding in, or riding on a vehicle of transportation when your injuries were sustained, or were you a pedestrian?

Driving/Riding

☐

Pedestrian

☐

What type of transportation were you driving, riding in, or riding on when your injuries were sustained? Or, if you were a pedestrian, what were you struck by?

Car, truck, or van

☐

Bus

☐

Taxicab

☐

Motorcycle

☐

Bicycle

☐

All Terrain Vehicle (ATV)

☐

Train or subway

☐

Airplane

☐

Watercraft (boat/jet ski)

☐

Other (please describe) \_\_\_\_\_

☐

If a seatbelt was available, were you wearing it?

Yes No N/A

If on a motorcycle, bicycle, etc., were you wearing a helmet?

Yes No N/A

If on a boat or other watercraft, were you wearing a life vest?

Yes No N/A

If you were in a vehicle, did the vehicle roll over?

Yes No N/A

Were you trapped or pinned in the collision?

Yes No

If yes, how long did it take to get you out?

Less than 10 minutes

☐

11 – 45 minutes

☐

More than 45 minutes

☐

If you were in a vehicle, was equipment used to remove you from the vehicle?

Yes No N/A

How would you rate the injuries you sustained in the collision?

Unremarkable

☐

Mild

☐

Moderate

☐

Severe

☐

Extreme/Life Threatening

☐

Have you ever had <b>any injury</b> this severe or more severe?	Yes	No
Were you burned in the collision?	Yes	No
At any time did you think you were going to die?	Yes	No
Did you lose consciousness at any time after the collision?	Yes	No
If yes, approximately how long were you unconscious? ____ Hours & ____ Minutes		
Were people you know (e.g., family, friends, coworkers) with you?	Yes	No
If yes, were any of them seriously injured?	Yes	No N/A
Were any of them killed?	Yes	No N/A
Were people you didn't know (e.g., strangers) involved in the collision?	Yes	No
If yes, were any of them seriously injured?	Yes	No N/A
Were any of them killed?	Yes	No N/A
During the collision or at any time since the collision have you experienced any of the following:		
A sense of emotional numbing, emotional detachment, or absence of emotional responsiveness?	Yes	No
A reduction in awareness of your surroundings (e.g., "being in a daze")?	Yes	No
Derealization – A feeling that things around you are not real?	Yes	No
Depersonalization – A feeling that you are not real or are detached from the environment?	Yes	No
Amnesia – An inability to recall an important aspect of the trauma?	Yes	No
How many times <b>in your life</b> have you been in transportation-related collisions? (not including this most recent collision)?	#	_____
How many times <b>in the last year</b> have you been in transportation-related collisions? (not including this most recent collision)?	#	_____
How many times <b>in your life</b> have you been <b>injured</b> in transportation-related collisions? (not including this most recent collision)?	#	_____
How many times <b>in the last year</b> have you been <b>injured</b> in transportation-related collisions? (not including this most recent collision)?	#	_____

How much control did **you** have over the events that caused the collision?

No Control      Little Control      Some Control      Much Control      Total Control

How much control did other people have over the events that caused the collision?

No Control      Little Control      Some Control      Much Control      Total Control

How much control do you have over your recovery process right now?

No Control      Little Control      Some Control      Much Control      Total Control

How much control do other people have over your recovery process right now?

No Control      Little Control      Some Control      Much Control      Total Control

How much control do you have over your life in general right now?

No Control      Little Control      Some Control      Much Control      Total Control

How much control do other people have over your life in general right now?

No Control      Little Control      Some Control      Much Control      Total Control

How much control do you have in preventing a collision like this from happening to you again?

No Control      Little Control      Some Control      Much Control      Total Control

How much control do other people have in preventing a collision like this from happening to you again?

No Control      Little Control      Some Control      Much Control      Total Control

How likely is it that an event this bad or worse will happen to you again?

Very Unlikely      Unlikely      It's Possible      Likely      Very Likely

Circle the number of the level of pain you have experienced, **on average**, since your collision?

0      1      2      3      4      5      6      7      8      9  
No Pain      Extreme Pain

Do you feel guilty about the collision?

Yes No

Have you been seriously depressed at some time in your life?

Yes No

Has a doctor ever treated you for depression?

Yes No

Did you have serious depression at the time of the collision?

Yes No

Have you had serious prolonged anxiety at some time in your life?

Yes No

Has a doctor ever treated you for serious prolonged anxiety?

Yes No

Did you have serious prolonged anxiety at the time of the collision?

Yes No

Is there anything that you are extremely afraid of (e.g., afraid of heights)? Yes No

If yes, briefly list here: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Within the 12 months before the collision,** were there events that were extremely stressful for you? For example, experiencing a natural disaster, fire, severe injury, being a victim of assault or abuse (physical, sexual, mental), threat to self, threat to family, lost a loved one, major financial crisis, etc? Yes No

If yes, please very briefly describe the nature of the stressful event(s).

---

---

---

---

**Prior to 12 months before the collision,** were there events that were extremely stressful for you? For example, experiencing a natural disaster, fire, severe injury, being a victim of assault or abuse (physical, sexual, mental), threat to self, threat to family, lost a loved one, major financial crisis, etc? Yes No

If yes, please very briefly describe the nature of the stressful event(s).

---

---

---

---

---

---

Has a doctor ever told you that you may have had a serious reaction to stress? Yes No

Has this event changed your life for the better or worse, or not changed your life at all?  
Changed for Better Changed for Worse Not Changed at All

Do you think you will be at least partially disabled by this injury in 3 months? Yes No

Do you think you will be at least partially disabled by this injury in 12 months? Yes No

Do you think that you will ever be the same again? Yes No

Are you satisfied with the care you receive from your current doctor? Yes No

Are you satisfied with the care you receive from the hospital staff, not including your current doctor? Yes No

How concerned are you about your ability to pay your hospital and doctor bills?  
No Concern Little Concern Some Concern Much Concern Total Concern

Were you found legally liable or issued a ticket for this collision? Yes No

Have you or do you intend to talk to an attorney about compensation for injuries sustained in this collision? Yes No

Have you ever felt you should cut down on your drinking or drug use? Yes No

Have people annoyed you by criticizing your drinking or drug use? Yes No

Have you ever felt bad or guilty about your drinking or drug use? Yes No

Have you ever had a drink or drug first thing in the morning (an eye opener) to steady your nerves or get rid of a hangover? Yes No

Before the collision, approximately how many alcoholic drinks did you consume per week? # \_\_\_\_\_

Is there a family member or friend who has been checking on you regularly since the collision? Yes No

Has the collision brought you closer to your family or friends? Yes No

How much social and emotional support do feel you have right now?  
No Support Little Support Some Support Much Support Total Support

Are you able to do anything you enjoy right now (e.g., leisure or recreational activities, hobbies, games, etc.)? Yes No

Do you believe in God or a Higher Power? Yes No

**If yes (you believe in God or a Higher Power), please complete the following five questions and then continue to the next page. If no, just continue to the next page now.**

1. How much control did God/A Higher Power have over the events that caused the collision?  
No Control Little Control Some Control Much Control Total Control

2. How much control does God/A Higher Power have over your recovery process right now?  
No Control Little Control Some Control Much Control Total Control

3. How much control does God/A Higher Power have over your life in general right now?  
No Control Little Control Some Control Much Control Total Control

4. How much control does God/A Higher Power have in preventing a collision like this from happening to you again?  
No Control Little Control Some Control Much Control Total Control

5. Has the collision brought you closer to God/A Higher Power? Yes No

**Below is a list of the ways you might have felt or behaved. Please tell how often you have felt this way during the past week.**

**During the Past Week**

	Rarely or none of the time (less than 1 day)	Some or a little of the time (1-2 days)	Occasionally or a moderate amount of time (3-4 days)	Most or all of the time (5-7 days)
1. I was bothered by things that usually don't bother me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. I did not feel like eating; my appetite was poor.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. I felt that I could not shake off the blues even with help from my family or friends.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. I felt I was just as good as other people.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. I had trouble keeping my mind on what I was doing.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. I felt depressed.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. I felt that everything I did was an effort.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. I felt hopeful about the future.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. I thought my life had been a failure.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. I felt fearful.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. My sleep was restless.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. I was happy.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. I talked less than usual.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. I felt lonely.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. People were unfriendly.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. I enjoyed life.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. I had crying spells.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. I felt sad.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. I felt that people dislike me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. I could not get "going."	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

If you have had any problems with this questionnaire, please ask the research assistant for help. Some questions in this packet may be sensitive and personal in nature. You have the option for referral to the psychological services department to discuss any problems you may be having.

Would you like to be referred to the psychological services department?    Yes    No

Thank you for taking the time to complete this questionnaire. If you are interested in the results of this study you may contact Kimberly Kelly, Ph.D. at #940-565-4719. Please return this questionnaire to the research assistant.

## STOP HERE

\* \* THIS AREA FOR RESEARCHER USE ONLY \* \*

Contact date: \_\_\_\_\_

Contacted by: \_\_\_\_\_

Name of hospital: \_\_\_\_\_

Glasgow #: \_\_\_\_\_ AU: Yes / No

TBI or MHI: Yes / No                      DU: Yes / No

Questionnaire Assistance Level (check one):

    Low (No assistance)

    Medium (Some assistance reading/answering some questions)

    High (Assistance with all/most of questions)

Observations/Notes: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



## APPENDIX B

### SUBJECT RECRUITMENT NOTICE

# Research Study

## **Seeking voluntary subjects**

Who are inpatients, 16 years old or older, able to read and speak English, able to complete a questionnaire, receiving some rehabilitation, and were involved in a

### **Transportation-Related Collision**

Transportation-related collisions are those involving automobiles, trucks, buses, taxis, motorcycles, bicycles, all terrain vehicles (ATV), snowmobiles, boats or other watercraft, airplanes, trains, or any other transportation-related vehicle as well as pedestrian/vehicular collisions.

**Please contact Quinn Biggs, MPH with referrals**

Phone: 555-555-5555 Ext. 5555 or 555-555-5555  
or pager: 555-555-5555

APPENDIX C

CONSENT FORM

## CONSENT TO PARTICIPATE IN RESEARCH

Title of Research: Transportation trauma and psychological morbidity: Anxiety, depression, PTSD, and perceived control in a hospitalized sample

Investigators: Quinn Biggs, MPH, office 555-555-5555 Ext. 5555, pager 555-555-5555

**INVITATION:** You are being invited to participate in this research because you: a) were involved in a transportation-related collision, b) are 16 years old or older, c) are hospitalized and receiving rehabilitation, d) have the ability to read and speak English without the aid of an interpreter, and e) appear to have the ability to complete the study.

**PURPOSE:** Some people have psychological distress after a collision. The early signs of distress are not well known. The purpose of this research is to find early signs of distress. If early signs are found, future collision survivors may get faster and better treatment and they may have less distress.

## PROCEDURES

**Questionnaire:** Participation includes completing one questionnaire. It will take about 30-45 minutes. The questionnaire is a mix of standard and new questions. A University of North Texas dissertation committee approved all questions. Nothing more will be asked of you.

**Information from chart:** After you have authorized use of your health information by signing a separate form, the investigators will look at your medical chart. If there is information about your mental status upon admission, it will be recorded. The information will be used to compare your mental status and your level of distress.

## POSSIBLE RISKS

**Questionnaire:** You will be asked to recall information that may be sensitive or personal. This information may cause problems for you, such as feelings of emotional discomfort or distress.

**What to do if you have problems:** It is not always possible to predict whether you will have problems or not. If you have problems, please tell the research investigator. The investigators' telephone numbers are on the first page of this consent form. You may also be referred to the hospital's psychological services department. You may choose to stop participation at any time.

## POSSIBLE BENEFITS

**Benefit to you:** Recalling sensitive or personal information may benefit you. By participating, you may find areas in which you need help. Finding and working through problem areas may help you to feel better now and in the future. However, the investigators cannot be sure that you will feel better by participating in this research.

**Benefit to others who have been in a collision:** If you participate, you could provide information that may be of help to others. You could help investigators find early signs of distress. This could lead to

better treatment for future collision survivors. The benefit to other collision survivors will not be known until all the data have been collected and reviewed.

**ALTERNATIVES TO PARTICIPATION IN THIS RESEARCH:** You can choose to participate in this research or not. If you do not participate, your medical care will continue as planned.

**THE STUDY INVESTIGATOR'S DECISION TO STOP YOUR PARTICIPATION:** The investigator may stop your participation without your approval. This might happen if: a) you are unable to complete the study, b) you are unable to follow the instructions, c) your health problems become worse, or d) the research study is cancelled.

**INCENTIVE TO PARTICIPATE:** You will not be paid to participate in this study.

**COSTS TO YOU:** There are no costs to you for participating in this research. However, you may incur expenses for services if you speak with the hospital's psychological services department. Any expenses related to your medical or psychological care are your responsibility (or the responsibility of your insurance provider or government program).

**COMPENSATION FOR INJURY:** Compensation for injury resulting from participation in this research is not available from St. James Hospital and Health Centers, and/or the University of North Texas. You retain your legal rights during your participation in this research.

**VOLUNTARY PARTICIPATION IN RESEARCH:** You have the right to agree or refuse to participate in this research. If you decide to take part and later change your mind, you are free to stop participation at any time. Refusal to participate will involve no penalty or loss of benefits to which you are otherwise entitled. Refusal to participate will not affect your legal rights or the quality of health care that you receive at this center.

**RECORDS OF YOUR PARTICIPATION IN THIS RESEARCH:** You have the right to privacy. Any information about you that is collected for this research will remain confidential as required by law. Your name or other identifying information will never be linked with your responses on the questionnaire or the information collected from your chart. Publication of the study results will not identify you in any way. In addition to this consent form, you will be asked to sign an "Authorization for Use and Disclosure of Protected Health Information for Research Purposes."

**YOUR QUESTIONS:** The research investigators are available to answer your questions about this research. Please ask as many questions as you wish. Their responses could help you decide whether to participate. Telephone numbers for the investigators are on the first page of this consent form.

This research study has been reviewed and approved by the University of North Texas Institutional Review Board (IRB). Contact the UNT IRB at (555) 555-5555 or 5555@unt.edu if there are any questions regarding your rights as a research subject.

This research has also been reviewed and approved by the St. James Hospital and Health Centers Institutional Review Board (IRB). Contact the St. James Hospital and Health Centers IRB at Phone # 555-555-5555 Ext. 5555 if there are any questions regarding your rights as a research subject.

The Chairman of the IRB is available to answer questions about your rights as a participant in research. The Chairman can also answer questions about an injury or other complication that may result from your participation in this research. You may telephone the Chairman of the IRB during regular office hours at Phone # 555-555-5555 Ext. 5555.

**RESEARCH RESULTS:** The results of this study can be obtained by writing to name of professor, name of university, name of department, address 5555, city, state, zip code, or by e-mailing Name of professor at 5555@university.edu.

**YOU WILL HAVE A COPY OF THIS CONSENT FORM TO KEEP.**

Your signature below certifies the following:

- You have read (or been read) the information provided above.
- You have received answers to all of your questions.
- You have freely decided to participate in this research.
- You understand that you are not giving up any of your legal rights.

\_\_\_\_\_  
Participant's Name (printed)

\_\_\_\_\_  
Participant's Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Legally authorized representative's name (printed)

\_\_\_\_\_  
Legally authorized representative's Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Name (printed) of person obtaining Consent

\_\_\_\_\_  
Signature of person obtaining consent

\_\_\_\_\_  
Date

**ASSENT OF A MINOR:**

I have discussed my participation in this research with my mother or father or legal guardian and the research investigator, and I agree to participate in this research.

\_\_\_\_\_  
Signature (participants 16 or 17 years old)

\_\_\_\_\_  
Date

APPENDIX D

HIPAA AUTHORIZATION

St. James Hospital and Health Centers

**Authorization for Use and Disclosure of  
Health Information for Research Purposes**

NAME OF RESEARCH PARTICIPANT: \_\_\_\_\_

1. You agree to let the St. James Hospital and Health Centers share your health information with Quinn M. Biggs, MPH and his or her staff at St. James Hospital and Health Centers and University of North Texas (“Researchers”) for the purpose of the following research study: Transportation trauma and psychological morbidity: anxiety, depression, PTSD, and perceived control in a hospitalized sample, a study investigating the psychological difficulties patients may experience following a transportation-related trauma, IRB# 241 (“Research Project”).

2. You agree to let the Researchers use your health information for this Research Project. You also agree to let the Researchers share your health information with others who may be working with the Researchers on the Research Project (“Recipients”) as follows.

- The University of North Texas is working with St. James Hospital and Health Centers on this Research Project.
- The University of North Texas Institutional Review Board (IRB). This is a group of people who are responsible for assuring that the rights of participants in research are respected. Members and staff of the IRB at the University of North Texas may review the records of your participation in this research. A representative of the IRB may contact you for information about your experience with this research. If you do not want to answer their questions, you may refuse to do so.
- The St. James Hospital and Health Centers Institutional Review Board (IRB). This is a group of people who are responsible for assuring that the rights of participants in research are respected. Members and staff of the IRB at St. James Hospital and Health Centers may review the records of your participation in this research. A representative of the IRB may contact you for information about your experience with this research. If you do not want to answer their questions, you may refuse to do so.
- Representatives of the Office of Human Research Protections (OHRP). The OHRP may oversee the Research Project to confirm compliance with laws, regulations and ethical standards.

3. Whenever possible your health information will be kept confidential. Federal privacy laws may not apply to some institutions outside of St. James Hospital and Health Centers. There is a risk that the Recipients could share your information with others without your permission. St. James Hospital and Health Centers cannot guarantee the confidentiality of your health information after it has been shared with the Recipients.

4. You agree to permit the Researchers to use and share your health information as listed below: all of your responses on the research study’s questionnaire and any mention of collision-related alcohol/drug use, the presence of a head injury, and the Glasgow Coma Scale (GCS) score from your patient chart.

5. The Researchers may use your health information to create research data that does not identify you. Research data that does not identify you may be used and shared by the Researchers (for example, in a



publication about the results of the Research Project); it may also be used and shared by the Researchers and Recipients for other research purposes not related to the Research Project.

6. This authorization is voluntary. Your health care providers must continue to provide you with health care services even if you choose not to sign this authorization. However, if you choose not to sign this authorization, you cannot take part in this Research Project.

7. This Authorization has no expiration date.

8. If you change your mind and do not want us to collect or share your health information, you may cancel this authorization at any time. If you decide to cancel this authorization, you will no longer be able to take part in the Research Project. The Researchers may still use and share the health information that they have already collected before you canceled the authorization. To cancel this authorization, you must make this request in writing to: Quinn M. Biggs, address 5555, city, state, zip code, office phone 555-555-5555 Ext. 5555 or pager 555-555-5555.

9. A copy of this authorization form will be provided to you.

\_\_\_\_\_  
Signature of Research Participant

\_\_\_\_\_  
Date

**For Legal Representatives of Research Participants (if applicable):**

Printed Name of Legal Representative: \_\_\_\_\_

Relationship to Research Participant: \_\_\_\_\_

I certify that I have the legal authority under applicable law to make this Authorization on behalf of the Research Participant identified above. The basis for this legal authority is:

\_\_\_\_\_  
(e.g. parent, legal guardian, person with legal power of attorney, etc.)

\_\_\_\_\_  
Signature of Legal Representative

\_\_\_\_\_  
Date

## REFERENCES

- Air Transport Association (2007). Safety record of U.S. air carriers. Retrieved January 25, 2007, from [www.airlines.org/economics/specialtopics/SafetyRecordOfCarriers.htm](http://www.airlines.org/economics/specialtopics/SafetyRecordOfCarriers.htm)
- Allen, J. P., & Columbus, M. (1995). *Assessing alcohol problems: A guide for clinicians and researchers*. Bethesda, MD: National Institutes of Health. Publication 95-3745.
- American Psychiatric Association (1987). *Diagnostic and statistical manual of mental disorders* (3rd ed., revised). Washington, DC: American Psychiatric Press.
- American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC: American Psychiatric Press.
- American Psychological Association (2002). *Ethical principles of psychologists and code of conduct*. Retrieved August 2, 2004 from [www.apa.org/ethics/code2002.html](http://www.apa.org/ethics/code2002.html)
- Barlow, D. H., & Cerny, J. A. (1988). *Psychological treatment for panic*. New York: Guilford.
- Barton, K. A., Blanchard, E. B., & Hickling, E. J. (1996). Antecedents and consequences of acute stress disorder among motor vehicle accident victims. *Behaviour, Research and Therapy*, 34, 805-813.
- Beck, A. T., Epstein, N., Brown, G., & Steer, R. A. (1988). An inventory for measuring clinical anxiety: Psychometric properties. *Journal of Consulting and Clinical Psychology*, 56, 893-397.
- Bernstein, D. M. (1999). Recovery from mild head injury. *Brain Injury*, 13, 151-172.
- Bernstein, E. M., & Putnam, F. W. (1986). Development, reliability, and validity of a dissociation scale. *Journal of Nervous and Mental Disease*, 174, 727-735.
- Blanchard, E. B., & Hickling, E. J. (1997). *After the crash: Assessment and treatment of motor vehicle accident survivors*. Washington, D. C.: American Psychological Association.
- Blanchard, E. B., & Hickling, E. J. (2004). *After the crash: Assessment and treatment of motor vehicle accident survivors* (2nd ed.). Washington DC: American Psychological Association.
- Blanchard, E. B., Hickling, E. J., & Taylor, A. E. (1995). Psychiatric morbidity associated with motor vehicle accidents. *Journal of Nervous and Mental Disease*, 183, 495-504.
- Blanchard, E. B., Hickling, E. J., Vollmer, A. J., Loos, W. R., Buckley, T. C., & Jaccard, J. (1995). Short-term follow-up of post-traumatic stress symptoms in motor vehicle accident victims. *Behaviour Research and Therapy*, 33, 369-377.
- Brady, K. T. (1997). Posttraumatic stress disorder and comorbidity: Recognizing the many faces of PTSD. *Journal of Clinical Psychiatry*, 58 (Suppl. 9), 12-15.

- Bremner, J. D. (1999). Acute and chronic responses to psychological trauma: Where do we go from here? *American Journal of Psychiatry*, 156, 349-351.
- Bremner, J. D., & Brett, E. (1997). Trauma-related dissociative states and long-term psychopathology in posttraumatic stress disorder. *Journal of Traumatic Stress*, 10, 37-50.
- Bremner, J. D., Krystal, J. H., Charney, D. S., & Southwick, S. M. (1996a). Neural mechanisms in dissociative amnesia for childhood abuse: Relevance to the current controversy surrounding the "false memory syndrome." *American Journal of Psychiatry*, 153, FS71-82.
- Bremner, J. D., Southwick, S., Brett, E., Fontana, A., Rosenheck, R., & Charney, D. S. (1992). Dissociation and posttraumatic stress disorder in Vietnam combat veterans. *American Journal of Psychiatry*, 149, 328-332.
- Bremner, J. D., Southwick, S. M., Johnson, D. R., Yehuda, R., & Charney, D. S. (1993). Childhood physical abuse and combat-related posttraumatic stress disorder in Vietnam veterans. *American Journal of Psychiatry*, 150, 235-239.
- Brewin, C. R., Andrews, B., & Valentine, J. D. (2000). Meta-analysis of risk factors for posttraumatic stress disorder in trauma-exposed adults. *Journal of Consulting and Clinical Psychology*, 68, 748-766.
- Brewin, C. R., Dalgleish, T., & Joseph, S. (1996). A dual representation theory of posttraumatic stress disorder. *Psychological Review*, 103, 670-686.
- Brom, D., Kleber, R. J., & Hofman, M. C. (1993). Victims of traffic accidents: Incidence and prevention of post-traumatic stress disorder. *Journal of Clinical Psychology*, 49, 131-140.
- Bryant, R. A., & Harvey, A. G. (1996). Initial posttraumatic stress responses following motor vehicle accidents. *Journal of Traumatic Stress*, 9, 223-234.
- Bush, B., Shaw, S., Cleary, P., Delbanco, T. L., & Aronson, M. D. (1987). Screening for alcohol abuse using the CAGE questionnaire. *American Journal of Medicine*, 82, 231-235.
- Butler, D. J., Moffic, H. S., & Turkal, N. W. (1999). Post-traumatic stress reactions following motor vehicle accidents. *American Family Physician*, 60, 524-531.
- Carver, C. S., Harris, S. D., Lehman, J. M., Durel, L. A., Antoni, M. H., Spencer, S. M., et al. (2000). How important is the perception of personal control? Studies of early stage breast cancer patients. *Personality and Social Psychology Bulletin*, 26, 139-149.
- Chorpita, B. F., & Barlow, D. H., (1998). The development of anxiety: The role of control in the early environment. *Psychological Bulletin*, 124, 3-21.
- Chubb, H. L., & Bisson, J. I. (1996). Early psychological reactions in a group of individuals with pre-existing and enduring mental health difficulties following a major coach accident. *British Journal of Psychiatry*, 169, 430-433.

- Collision. (n.d.). WordNet® 2.1. Retrieved January 25, 2007, from Dictionary.com website: <http://dictionary.reference.com/browse/collision>
- Davidson, J. R. T. (2003). *Davidson Trauma Scale (DTS)*. North Tonawanda, NY: Multi-Health Systems.
- Davidson, J. R. T., Book, S. W., Colket, J. T., Tupler, L. A., Roth, S., David, D., et al. (1997). Assessment of a new self-rating scale for posttraumatic stress disorder: The Davidson Trauma Scale. *Psychological Medicine*, 27, 153-160.
- Davidson, J. R. T., Hughes, D., Blazer, D. G., & George, L. K. (1991). Posttraumatic stress disorder in the community: An epidemiological study. *Psychological Medicine*, 21, 713-721.
- Delahanty, D. L., Herberman, H. B., Craig, K. J., & Hayward, M. C., Fullerton, C. S., Ursano, R. J., et al. (1997). Acute and chronic distress and posttraumatic stress disorder as a function of responsibility for serious motor vehicle accidents. *Journal of Consulting and Clinical Psychology*, 65, 560-567.
- Di Gallo, A., & Parry-Jones, W. L. (1996). Psychological sequelae of road traffic accidents: An inadequately addressed problem [Editorial]. *British Journal of Psychiatry*, 169, 405-407.
- Estonia, R. S. (1993). Avoidant symptoms cloaking the diagnosis of posttraumatic stress syndrome. *Journal of Traumatic Stress*, 6, 451-458.
- Ewing, J. A. (1984). Detecting alcoholism: The CAGE questionnaire. *Journal of the American Medical Association*, 252, 1905-1907.
- Ewing, J. A., & Rouse, B. A. (1970, February). *Identifying the hidden alcoholic*. Program and abstracts of the 29th International Congress on Alcohol and Drug Dependence, Sydney, Australia.
- Firth-Cozens, J. & Brewin, C. R. (1988). Attributional change during psychotherapy. *British Journal of Clinical Psychology*, 27, 47-54.
- Fleming, J. M., Strong, J., & Ashton, R. (1998). Cluster analysis of self-awareness levels in adults with traumatic brain injury and relationship to outcome. *Journal of Head Trauma Rehabilitation*, 13, 39-51.
- Foa, E. B., Zinbarg, R., & Rothbaum, B. O. (1992). Uncontrollability and unpredictability in post-traumatic stress disorder: An animal model. *Psychological Bulletin*, 112, 218-238.
- Frazier, P. (2000). The role of attributions and perceived control in recovery from rape. *Journal of Personal and Interpersonal Loss*, 5, 203-225.
- Frazier, P., Berman, M., & Steward, J. (2002). Perceived control and posttraumatic stress: A temporal model. *Applied and Preventive Psychology*, 10, 207-223.

- Frazier, P., Conlon, A., & Glaser, T. (2001). Positive and negative life changes following sexual assault. *Journal of Consulting and Clinical Psychology*, 69, 1048-1055.
- Fydrich, T., Dowdall, D., & Chambless, D. L. (1990, March). *Aspects of reliability and validity for the Beck Anxiety Inventory*. Paper presented at the National Conference on Phobias and Related Anxiety Disorders, Bethesda, MD.
- Girela, E., Villanueva, E., Hernandez-Cueto, C., & Luna, J. D. (1994). Comparison of the CAGE questionnaire versus some biochemical markers in the diagnosis of alcoholism. *Alcohol and Alcoholism*, 29, 337-343.
- Goldberg, L., & Gara, M. A. (1990). A typology of psychiatric reactions to motor vehicle accidents. *Psychopathology*, 23, 15-20.
- Green, B. L. (1994). Psychosocial research in traumatic stress: An update. *Journal of Traumatic Stress*, 7, 341-362.
- Green, M. M., McFarlane, A. C., Hunter, C. E., & Griggs, W. M. (1993). Undiagnosed post-traumatic stress disorder following motor vehicle accidents. *Medical Journal of Australia*, 159, 529-534.
- Gregg, W., Medley, I., Fowler-Dixon, R., Curran, G., Loughrey, P., Bell, P., et al. (1995). Psychological consequences of the Kegworth air disaster. *British Journal of Psychiatry*, 167, 812-817.
- Hamilton, M. (1959). The assessment of anxiety states by rating. *British Journal of Medical Psychology*, 32, 50-55.
- Helgeson, V. S. (1992). Moderators of the relation between perceived control and adjustment to chronic illness. *Journal of Personality and Social Psychology*, 63, 656-666.
- Helzer, J. E., Robins, L. N., & McEvoy, L. (1987). Post-traumatic stress disorder in the general population. Findings from the Epidemiological Catchment Area Survey. *New England Journal of Medicine*, 317, 1630-1634.
- Hickling, E. J., & Blanchard, E. B. (1992). Post-traumatic stress disorder and motor vehicle accidents. *Journal of Anxiety Disorders*, 6, 285-291.
- Hickling, E. J., Blanchard, E. B., Silverman, D. J., & Schwarz, S. (1992). Motor vehicle accidents, headaches and posttraumatic stress disorder: Assessment findings in a consecutive series. *Headache*, 32, 147-151.
- Horowitz, M. J. (1986). *Stress response syndromes* (2nd ed.). New York: Jason Aronson.
- Hyman, M. M. (1968). Accident vulnerability and blood alcohol concentrations of drivers by demographic characteristics. *Quarterly Journal of Studies on Alcohol*, (Suppl. 4), 34-57.

- Insurance Institute for Highway Safety, Highway Loss Data Institute. (2002). Fatality facts. Retrieved December 16, 2002 from <http://www.iihs.org>
- Janoff-Bulman, R. (1992). *Shattered assumptions: Towards a new psychology of trauma*. New York: Free Press.
- Johnston, M. V., Findley, T. W., DeLuca, J., & Katz, R. T. (1991). Measurement tools with application to brain injury. *American Journal of Physical Medicine & Rehabilitation*, 70, S114-S130.
- Jones, T. V., Lindsey, B. A., Yount, P., Soltys, R., & Farani-Enayat, B. (1993). Alcoholism screening questionnaires: Are they valid in elderly medical outpatients? *Journal of Internal Medicine*, 8, 674-678.
- Joseph, S. A., Andrews, B., Williams, R., & Yule, W. (1992). Crisis support and psychiatric symptomology in adult survivors of the Jupiter cruise ship disaster. *British Journal of Clinical Psychology*, 31, 63-74.
- Joseph, S. A., Brewin, C. R., Yule, W., & Williams, R. (1991). Causal attributions and psychiatric symptoms in survivors of the Herald of Free Enterprise disaster. *British Journal of Psychiatry*, 159, 542-546.
- Joseph, S. A., Yule, W., Williams, R., & Andrews, B. (1993). Crisis support in the aftermath of disaster: A longitudinal perspective. *British Journal of Clinical Psychology*, 32, 177-185.
- Kay, T., Newman, B., Cavallo, M., Ezrachi, O., & Resnick, M. (1992). Toward a neuropsychological model of functional disability after mild traumatic brain injury. *Neuropsychology*, 6, 371-384.
- Kessler, R. C., Sonnega, A., Bromet, E., Hughes, M., & Nelson, C. B. (1995). Posttraumatic stress disorder in the National Comorbidity Survey. *Archives of General Psychiatry*, 52, 1048-1060.
- Koopman, C., Classen, C., & Spiegel, D. (1994). Predictors of posttraumatic stress symptoms among survivors of the Oakland/Berkeley, Calif., firestorm. *American Journal of Psychiatry*, 151, 888-894.
- Kuch, K., Cox, B. J., & Evans, R. J. (1996). Posttraumatic stress disorder and motor vehicle accidents: A multidisciplinary overview. *Canadian Journal of Psychiatry*, 41, 429-434.
- Kuch, K., Swinson, R. P., & Kirby, M. (1985). Posttraumatic stress disorder after car accidents. *Canadian Journal of Psychiatry*, 30, 426-427.
- Kulka, R. A., Schlenger, W. E., Fairbank, J. A., Hough, R. L., Jordan, B. K., Marmar, C. R., et al. (1990). *Trauma and the Vietnam War generation: Report of findings from the National Vietnam Veterans Readjustment Study*. New York: Brunner/Mazel.

- Lairson, D. R., Harrist, R., Martin, D. W., Ramby, R., Rustin, T. A., Swint, J. M., et al. (1992). Screening for patients with alcohol problems: Severity of patients identified by the CAGE. *Journal of Drug Education*, 22, 337-352.
- Luine, V., Villages, M., Martinex, C., & McEwen, B. S. (1994). Repeated stress causes reversible impairments of spatial memory performance. *Brain Research*, 639, 167-170.
- MacLeod, C. (1990). Mood disorders and cognition. In M. W. Eysenck (Ed.) *Cognitive psychology: An international review* (pp. 9-55). New York: Wiley.
- Marmar, C. R., Weiss, D. S., Schlenger, W. E., Fairbank, J. A., Jordan, B. K., Kulka, R. A., et al. (1994). Peritraumatic dissociation and posttraumatic stress in male Vietnam theater veterans. *American Journal of Psychiatry*, 151, 902-907.
- Mayou, R., Bryant, B., & Duthie, R. (1993). Psychiatric consequences of road traffic accidents. *British Medical Journal*, 307, 647-651.
- McCarty, R., & Gold, P. E. (1996). Catecholamines, stress and disease: A psychobiological perspective. *Psychosomatic Medicine*, 58, 590-597.
- McFarlane, A. C. (1989). The aetiology of post traumatic morbidity: Predisposing, precipitating and perpetuating factors. *British Journal of Psychiatry*, 154, 221-228.
- Measurement Excellence Initiative (2003). Critical review of Center for Epidemiologic Studies Depression Scale (CES-D). Retrieved October 16, 2003 from [http://www.measurementexperts.org/mei\\_compendium.asp?detail=12](http://www.measurementexperts.org/mei_compendium.asp?detail=12)
- Merck & Co., Inc. (1992). *The Merck manual* (16th ed.). Rahway, NJ: Merck Research Laboratories
- Myers, D., & Grant, G. (1970). A study of depersonalization in students. *British Journal of Psychiatry*, 121, 59-65.
- National Highway Traffic Safety Administration's National Center for Statistics and Analysis (2006). Occupant protection. (Publication No. DOT HS 810 621). Retrieved February 21, 2007, from <http://www-nrd.nhtsa.dot.gov/departments/nrd-30/ncsa/AvailInf.html>
- National Highway Traffic Safety Administration's National Center for Statistics and Analysis (2006). Traffic safety facts 2005 data. (Publication No. DOT HS 810 623). Retrieved January 22, 2007, from <http://www-nrd.nhtsa.dot.gov/departments/nrd-30/ncsa/AvailInf.html>
- Newsom, J. T., Knapp, J. E., & Schulz, R. (1996). Longitudinal analysis of specific domains of internal control and depressive symptoms in patients with recurrent cancer. *Health Psychology*, 15, 323-331.
- Nordhoff, L. S., Jr. (1996). *Motor vehicle collision injuries: Mechanisms, diagnosis, management*. Gaithersburg: Aspen Publishers.

- Norris, F. H. (1992). Epidemiology of trauma: Frequency and impact of different potentially traumatic events on different demographic groups. *Journal of Consulting and Clinical Psychology, 60*, 409-418.
- North, C. S., Smith, E. M., McCool, R. E., & Lightcap, P. E. (1989). Acute postdisaster coping and adjustment. *Journal of Traumatic Stress, 2*, 353-360.
- Noyes, R. (1985). Motor vehicle accidents related to psychiatric impairment. *Psychosomatics, 26*, 569-580.
- Perry, S. W., Cella, D. F., Falkenburg, J., Heidrich, G., & Goodwin, C. (1987). Pain perception in burn patients with stress disorders. *Journal of Pain Symptom Management, 2*, 29-33.
- Putnam, F. (1985). Dissociation as a response to extreme trauma. In R. Kluft (Ed.). *Childhood antecedents of multiple personality disorder*. Washington: American Psychiatric Press.
- Radloff, L. S. (1977). The CES-D scale: A self report depression scale for research in the general population. *Applied Psychological Measurement, 1*, 385-401.
- Raphael, B. (1986). *When disaster strikes. A handbook for the caring professions*. London: Hutchinson.
- Reed, G. M., Taylor, S. E., & Kemeny, M. E. (1993). Perceived control and psychological adjustment in gay men with AIDS. *Journal of Applied Social Psychology, 23*, 791-824.
- Richmond, T. S., & Kauder, D. (2000). Predictors of psychological distress following serious injury. *Journal of Traumatic Stress, 13*, 681-692.
- Riskind, J., Beck, A. T., Brown, G., & Steer, R. A. (1987). Taking the measure of anxiety and depression: Validity of the reconstructed Hamilton scales. *Journal of Nervous and Mental Disease, 175*, 474-479.
- Schwarz, E. D., & Perry, B. D. (1994). The post-traumatic response in children and adolescents. *Psychiatric Clinics of North America, 17*, 311-326.
- Shalev, A. Y., Peri, T., Canetti, L., & Schreiber, S. (1996). Predictors of PTSD in injured trauma survivors: A prospective study. *American Journal of Psychiatry, 153*, 219-225.
- Shore, J. H., Vollmer, W. M., & Tatum, E. L. (1989). Community patterns of post traumatic stress disorders. *Journal of Nervous and Mental Disease, 177*, 681-685.
- Skinner, E. A. (1996). A guide to constructs of control. *Journal of Personality and Social Psychology, 71*, 549-570.
- Smith, E. M., North, C. S., McCool, R. E., & Shea, J. M. (1990). Acute postdisaster psychiatric disorders: Identification of persons at risk. *American Journal of Psychiatry, 147*, 202-206.



- Solomon, S. (1986). Mobilizing social support networks in times of disaster. In C. Figley (Ed.), *Trauma and its wake*, Vol. 2, *Traumatic stress theory, research, and intervention* (pp. 232-263). New York: Brunner/Mazel.
- Spiegel, D., & Cardena, E. (1991). Disintegrated experience: The dissociative disorders revisited. *Journal of Abnormal Psychology*, 100, 366-378.
- Spielberger, C. D. (1983). *Manual for the State-Trait Anxiety Inventory (Form Y)*. Palo Alto, CA: Consulting Psychologists Press.
- Steinweg, D. L., & Worth, H. (1993). Alcoholism: The keys to the CAGE. *American Journal of Medicine*, 94, 520-523.
- Strickland, B. R. (1978). Internal-external expectancies and health-related behaviors. *Journal of Consulting and Clinical Psychology*, 46, 1192-1211.
- Teasdale, G., & Jennett, B. (1974). Assessment of coma and impairment of consciousness: A practical scale. *Lancet*, 2, 81-84.
- Tennen, H., & Affleck, G. (1990). Blaming others for threatening events. *Psychological Bulletin*, 108, 209-232.
- Transportation. (n.d.). The American Heritage® Dictionary of the English Language (4th ed.). Retrieved January 25, 2007, from Dictionary.com Website: <http://dictionary.reference.com/browse/transportation>
- Trauma.org (2003). Trauma scoring: Glasgow coma score. Retrieved September 5, 2003 from <http://www.trauma.org/scores/gcs.html>
- Ursano, R. J., Fullerton, C. S., Epstein, R. S., Crowley, B., Kao, T-C., Vance, K., et al. (1999). Acute and chronic posttraumatic stress disorder in motor vehicle accident victims. *American Journal of Psychiatry*, 156, 589-595.
- United States (US) Census Bureau (2003). Educational attainment: 2000, census 2000 brief. Retrieved February 15, 2007 from: <http://www.census.gov/prod/2003pubs/c2kbr-24.pdf>
- US Census Bureau (n.d.). Illinois - profile of selected economic characteristics: 2000. Retrieved February 15, 2007 from <http://www.factfinder.census.gov>
- US Census Bureau (n.d.). State and county quickfacts: People quickfacts 2005. Retrieved February 15, 2007, from <http://www.quickfacts.census.gov/qfd/states/17000.html>
- US Coast Guard, US Department of Homeland Security (2005). Boating statistics - 2004 (Publication No. COMDTPUB P16754.18). Retrieved January 24, 2007, from [www.uscgboating.org/statistics/Boating\\_Statistics\\_2004.pdf](http://www.uscgboating.org/statistics/Boating_Statistics_2004.pdf)

- US Department of Transportation, Federal Railroad Administration, Office of Safety Analysis (2006). Accident/incident details - 2005. Retrieved January 24, 2007, from <http://safetydata.fra.dot.gov/Prelim/2005/r01.htm>
- Weisaeth, L. (1984). *Stress reactions to an industrial accident*. MD thesis, Oslo University, Norway.
- Wilkinson, C. B. (1983). Aftermath of disaster: The collapse of the Hyatt Regency Hotel skywalks. *American Journal of Psychiatry*, 140, 1134-1139.
- Wu, K. K., & Cheung, W. L. (2006). Posttraumatic stress after a motor vehicle accident: A six-month follow-up study utilizing latent growth modeling. *Journal of Traumatic Stress*, 19, 923-936.
- Yehuda, R. (1998). Psychoneuroendocrinology of post-traumatic stress disorder. *Psychiatric Clinics of North America*, 21, 359-379.
- Yehuda, R. (1999). Biological factors associated with susceptibility to posttraumatic stress disorder. *Canadian Journal of Psychiatry (Revue Canadienne de Psychiatrie)*, 44, 34-39.
- Yehuda, R., & McFarlane, A., C. (1995). Conflict between current knowledge about posttraumatic stress disorder and its original conceptual basis. *American Journal of Psychiatry*, 152, 1705-1713.
- Yehuda, R., Teicher, M. H., Levengood, R., Trestman, R., & Siever, L. J. (1996). Cortisol regulation in posttraumatic stress disorder and major depression: A chronobiological analysis. *Biological Psychiatry*, 40, 79-88.